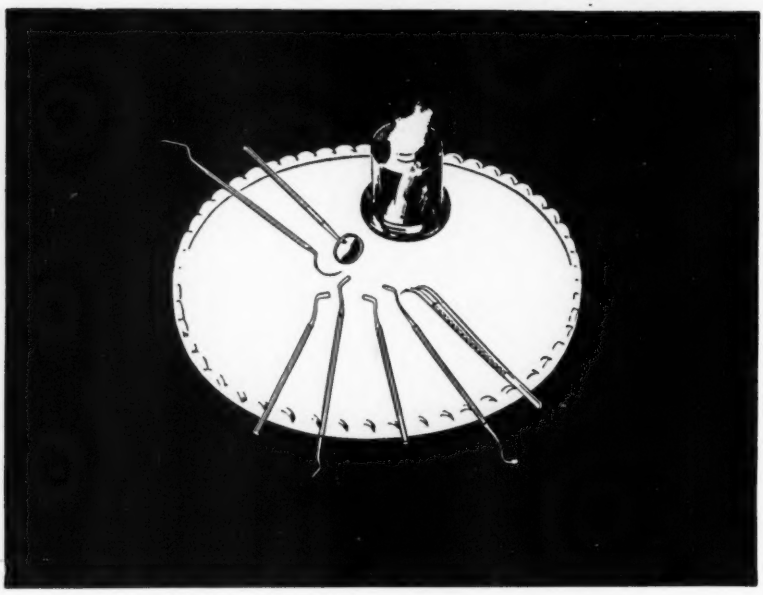
The DENTAL JOURNAL OF Australia

AUSTRALIAN DENTAL ASSOCIATION
N.S.W. BRANCH

VOLUME 13
NUMBER 1
MARCH, 1941



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Vol. 23 May-June, 1951 No. 5-6

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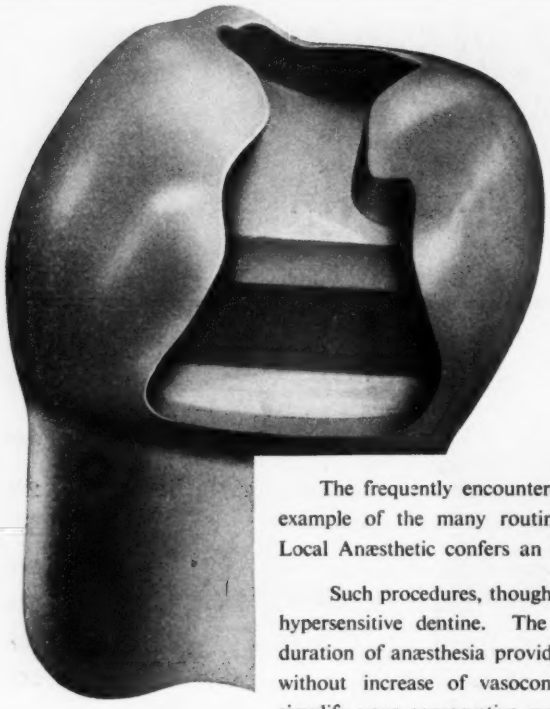
Honorary Editor: H. R. SULLIVAN, M.D.S.

Published by the Australian Dental Association (N.S.W. Branch)
B.M.A. HOUSE, 135-137 MACQUARIE STREET, SYDNEY.

Communications intended for publication in "The Dental Journal of Australia" should be addressed to the Editor. All advertising and business matters should be directed to the Secretary.

Subscription: £1/5/- per annum; Overseas, £1/10/-; Single Copy, 2/6.



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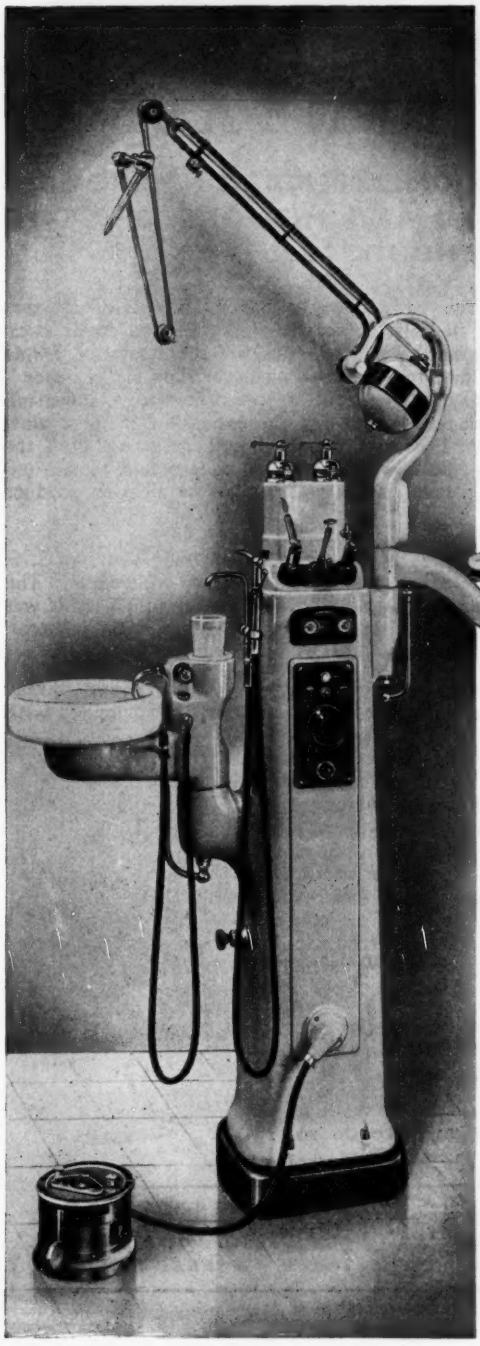

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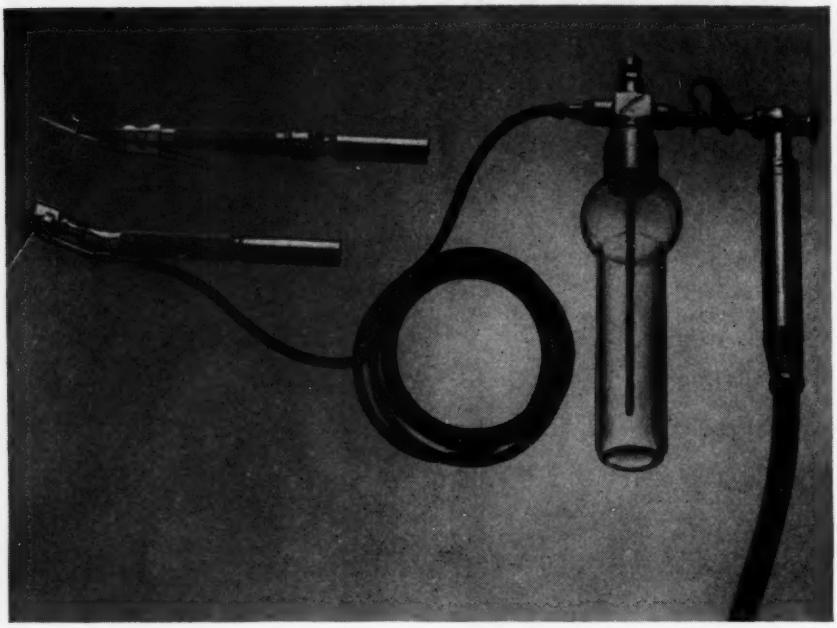

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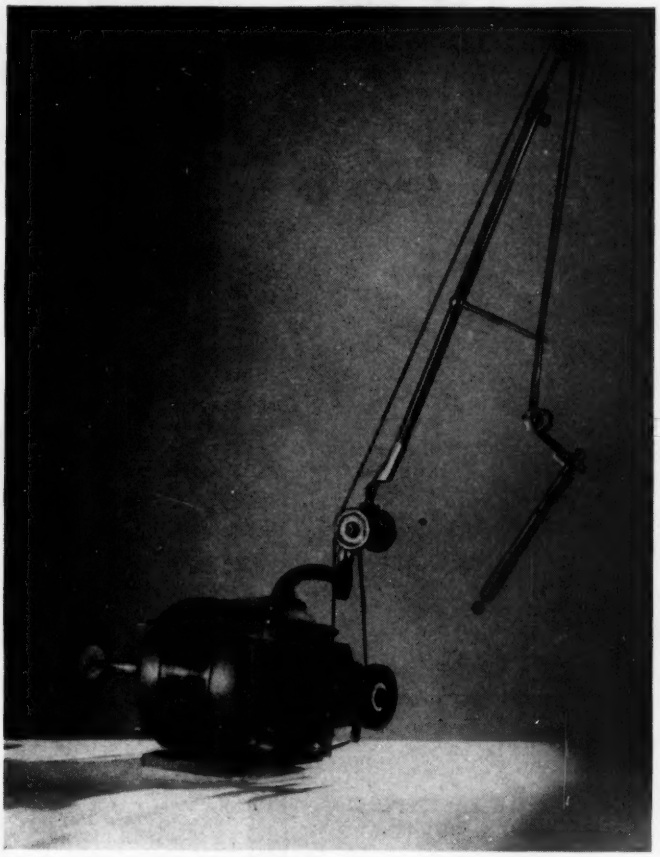

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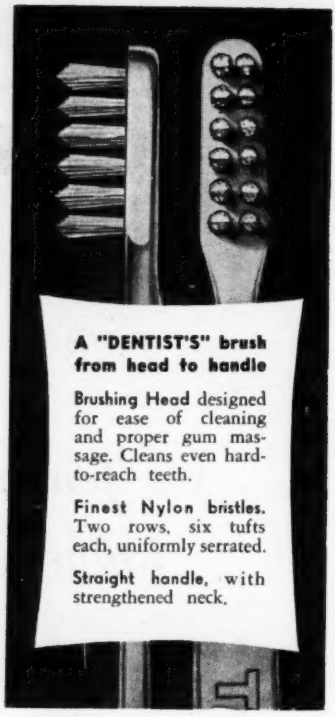
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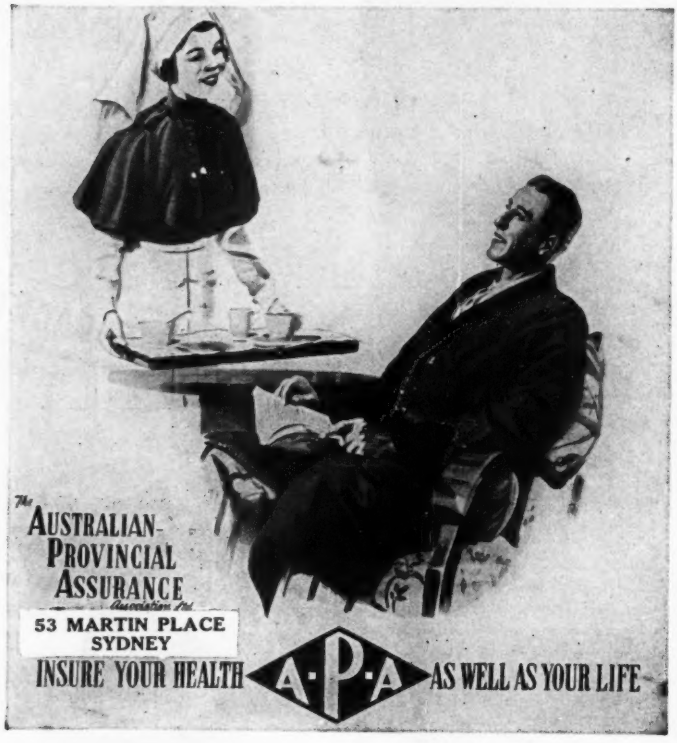

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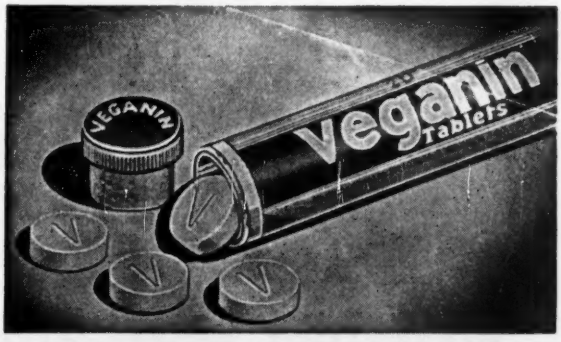

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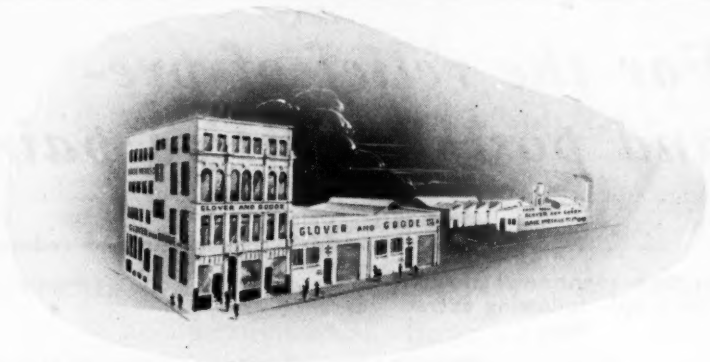

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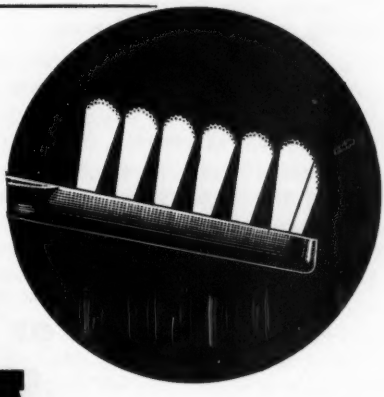

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The DENTAL Journal OF AUSTRALIA

Vol. 23 May-June, 1951 No. 5-6

PROPERTIES AND USE OF SOME RESTORATIVE MATERIALS*

ALAN R. DOCKING, M.Sc. (MELB.), A.A.C.I.†

This paper is not intended to be a comprehensive survey of restorative materials but is to be confined to a few aspects of the plastic filling materials, silver amalgam, silicate cement, and acrylic resin.

From the chemical point of view one could not have a greater range of materials—metallic amalgams, inorganic cements, and organic resins—yet they have several things in common. Each depends on the mixing of the powder and liquid followed by certain chemical and physical hardening reactions. The aim of each individual technique is to obtain in a short time a uniform mix of satisfactory working consistency which will remain in this state for a few minutes to allow for insertion in the cavity, and which will then harden rapidly with minimum dimensional change.

"Bricks and mortar": There is one other point of similarity which is worth noting. In some respects the plastic filling materials are like irregular bricks set in mortar. It is the unreacted or "brick" portion of the material that is the strongest component, whether it be the original silver-tin alloy particles (the hard "gamma" phase), the glass-like particles which constitute silicate cement powder, or the fully polymerised acrylic powder. The weaker "mortar" is the silver and tin amalgam matrix, the silicic acid formed in cements or the comparatively low molecular weight acrylic binding resin. To achieve maximum compressive strength the weaker mortar should be reduced to a minimum by using just enough to hold the restoration in a compact mass free from voids. In dental filling materials, as in concrete, the bricks are very irregular in shape and size except, perhaps, for some acrylic resin powders to which the analogy applies only imperfectly.

The minimum of matrix consistent with solidity and freedom from cavities is therefore desirable, particularly with cements. Too high a proportion of silicic acid matrix resulting from a thin mix of cement means greater solubility, greater staining, and reduced strength. With the other restorative materials likewise the weakness of the material is attributable to the matrix. With acrylic resins and amalgams there are, of course, other reasons for

*Read at the Twelfth Australian Dental Congress, Sydney, August, 1950.
†Commonwealth Bureau of Dental Standards.

limiting the proportion of matrix. The overall chemical change is reduced accordingly, and hence the setting shrinkage and, further, with acrylic resin there is less evolution of heat.

Avoid thin mixes: The moral is "do not be tempted to use too thin mixes even when they happen to be easier to manipulate." It is realised that with amalgams some of the excess mercury can be recovered during condensation but this is, of course, not possible with the other types.

A few comments based on recent work on the three classes of restorative material will be made, firstly in regard to amalgams.

Amalgam Restorations.

Choice of alloy: To make certain of a good start be sure to use alloys which comply with Australian Dental Standard No. T.2 and mercury which complies with Standard No. T.1. A list of these accredited materials has now been published[1] and it is understood that some others are under consideration. One cannot expect to obtain the highest class restoration from an alloy which will not meet the requirements of the Australian Standard however carefully it is manipulated.

It is interesting to note that Healey and Phillips[2], of Indiana, judged that 56 per cent. of a group of over 1,500 defective amalgam restorations were due to improper cavity preparation and 40 per cent. of them due to faulty manipulation or contamination at time of insertion. This accounts for the great majority of failures and it speaks volumes for the work of the American Dental Association Research Commission at the National Bureau of Standards and its lists of certified materials that so few failures are now attributable to the material itself.

Manipulation: One of the requirements of the specification is for dimensional change and we have confirmed the experience of others that to prevent undue shrinkage trituration should not be too severe. In using the pestle and mortar favour a pen grip with light pressure, and if mulling is still considered necessary make sure that this is not carried out in the bare palm. Besides improving the final properties of the restoration greater packing pressure means a faster hardening rate which is very desirable. In any case, after an occlusal amalgam restoration is completed, the patient should be reminded to avoid biting stresses for 6 or 8 hours as adequate strength for all emergencies is not developed until after this time[3, 4].

Finally, do not overlook the desirability of a final polish. Amalgams in which the residual mercury has been kept to a minimum should retain a polish quite well. Mosteller[5] has pointed out that, as a dentist would not consider leaving a gold inlay in the patient's mouth without first finishing and polishing, the same considerations should apply to amalgam restorations.

---

1. Australian Dental Association Standards Committee.—List of Certified Dental Materials, 15th July, 1950: Aust.J.Dent., 54:220, 1950.
2. Healey, H. J. and Phillips, R. W.—J.D.Res., 28:439-46, 1949.
3. Phillips, R. W.—J.D.Res., 28:348-55, 1949.
4. Taylor, N. O., *et al.*—J.D.Res., 28:228-41, 1949.
5. Mosteller, J. H.—D. Digest, 56:15-17, 1950.

Silicate Restorations.

With many millions of restorations each year to their credit and an average life of only 3 or 4 years to their discredit, silicate or porcelain cements call for some close inspection. A mixture of powdered glass and phosphoric acid for the filling of a tooth must seem to the layman as extraordinary as a mixture of a silver-tin alloy and mercury, but until recently there was little alternative for an aesthetic anterior filling. We seem to have come to an impasse as far as improving the silicate type of cement is concerned, so the only thing for the dentist to do is to use the best available material and to use it wisely.

Manipulation: The method of manipulation of cements is of paramount importance as those who have seen the excellent National Bureau of Standards' film on silicate cements will realise. The lesson of the cool, dry slab, the thick mix, and the moisture barrier during setting is driven home in a convincing manner.

A cool slab slows up the reaction and enables more powder to be incorporated for any given working consistency. It is easy to demonstrate that cooling a slab from, say, 90° to 70°F. will enable some 20 per cent. more powder to be used to give a particular consistency; therefore the slab should be cooled as far as possible without introducing complications through moisture condensation as a result of cooling below the dew point. As one of the best authorities, Paffenbarger[6], has said: "Cool the slab regardless of anyone's oral advice or advertising statements to the contrary." The use of thick mixes reduces the amount of acid introduced and limits the amount of weak, soluble and permeable silicic acid matrix. Short mixing times are preferable—all that is necessary is to coat each particle of powder with liquid. Paffenbarger recommends never more than one minute, preferably 30 seconds.

Pulp irritation: There seems to be little doubt now that the pulp irritation under silicate restorations is due to the use of phosphoric acid which appears to have a very deleterious action on the soft tissues, particularly in younger patients. There is still no consensus of opinion on this although much more work has been done since that classical answer to the questionnaire submitted ten years ago to a group of over 100 practising dentists co-operating with the A.D.A. Research Commission[7]. To the question: "Do you believe that silicate cements are more irritant to the pulp than are other restorative materials?" 45 per cent. replied "yes," 45 per cent. "no" and 10 per cent. were undecided.

A brief review of more recent literature on the subject revealed pleas from all quarters of at least the English-speaking world for routine cavity lining for restorations. Here are some examples:—

> *United Kingdom*: Harvey *et al.*[8] write: "Protection of the pulp and dentinal tubules from the acid cements is no longer a whim of the manufacturer or peculiarity of the practitioner but has become their responsibility to patients, especially to those in their first three decades."

---

6. Paffenbarger, G. C.—North-West Dentistry, 27 (1):29-37, 1948.
7. Paffenbarger, G. C.—J.A.D.A., 27:1611-22, 1940.
8. Harvey, W., *et al.*—B.D.J., 77:61-8, 89-99, 1944.

Canada: Pearson[9] states: "After 15 minutes the setting silicate has a pH of 3.6. After 4 hours it is 5.5 where it remains. *Therefore all cavities must be lined.*"

New Zealand: Shroff[10] graphically describes the introduction of a silicate filling as twisting a knife in an open wound. He then discusses the damage done and continues: "To date no more efficacious means has been found for preventing these ill-effects than by the use of zinc oxide and clove oil. It is suggested that the material should be used as a routine lining in every case where the silicate is regarded as the filling material of choice."

U.S.A.: Zander[11] concludes: "A non-irritating base such as zinc oxide-eugenol should be used, especially in young patients."

Paffenbarger[6] states: "A lining or barrier of some type should be interposed between the silicate cement restoration and the cavity walls because it is necessary to protect the pulp. Histologists have shown that any of the cements containing phosphoric acid irritate the pulp. Zinc oxide-eugenol cement does not."

One would conclude from the foregoing statements that the safest procedure would be to line cavities before inserting silicate cements. Silicate cements appear to differ little from one brand to another in regard to the acidity developed.

Solubility: The use of the minimum amount of phosphoric acid favours a longer life by reducing the amount of erosion and solution. In 1947 Weston[12] made an interesting observation from *in vitro* experiments with various buffered organic acids that the rate of disintegration of cements depends not only on the pH of the medium but also on the nature of the acids present. Hydroxy-organic acids such as lactic, citric, tartaric, are particularly potent and a patient's susceptibility to produce a lactic acid appears to be a definite factor in determining the life of a silicate restoration. Henschel[13], of a New York Research Group, reported last year the results of clinical observations on several thousand silicate cement restorations over a 20-year period. It was concluded that solubility in water or saliva is a negligible factor and that the so-called "washing out" is limited principally to the stagnant areas where food plaques accumulate and the circulation of the saliva is at a minimum. Henschel claims that clinical records indicate that life of these restorations is somewhat proportionate to the relative immunity to dental caries of the particular individual.

Care of restoration: In regard to the finished restoration there is no need to stress the importance of preventing both the access and loss of moisture during setting, for otherwise a soft, porous and easily stained surface will result.

Finally, polishing should be reduced to a minimum, for the set cement consists of hard particles embedded in a comparatively soft medium. An

9. Pearson, F. T.—J.C.D.A.—14:421-4, 1948.
10. Shroff, F. R.—Dentistry, 7:544-9, 607-8; 8:107-13, 1947.
11. Zander, H. A.—J.A.D.A., 33:1233-43, 1946.
12. Weston, P. E.—J.D.Res., 25:171-2, 1946.
13. Henschel, C. J.—J.D.Res., 28:528, 1949.

abrasive cutting across the surface of a material of this type pulls out the glass-like particles leaving a pebbly satin-finish surface which can never be made plane[6]. The highest possible polish is that given by a matrix strip.

Direct Acrylic Restorations.

Direct acrylic restorative materials are now available from England in a new form. A type requiring "heat shock," before polymerisation, has been available for some years but the most recent type is claimed to cure in the mouth in about 10 minutes without the application of any external heat. Heat is generated within the restoration, however, due to the rapid polymerisation that follows.

The A.D.A. Council on Dental Research[14] made a pronouncement this year that pending the outcome of investigations now in progress at the National Bureau of Standards their advice is to use the direct resinous filling materials for the types of cavities commonly suitable for silicate cement. At the same time the Council urged all users to follow precisely the directions of the manufacturer of the product in use.

Comparison with silicates: Let us then compare these new acrylic materials with silicate cements:—

(1) The technique is almost as simple. Care must be taken to use thick mixes as this reduces subsequent polymerisation contraction and evolution of heat. Good pressure must be continuously maintained on the restoration during hardening, and this pressure must be held for longer times than is required for the application of the matrix strip to silicate restorations.

(2) From the few reports so far to hand of tests on monkeys, acrylic monomer is at the most a very mild irritant to the pulp and any irritation is apparently only temporary. If this is so the use of linings is contra-indicated: zinc phosphate cements on account of their possible acidity effects and zinc oxide-eugenol cements because of a deleterious action of eugenol on the setting and properties of acrylic resin. However, Professor Ellis[15] considers that the question of the effect of methyl methacrylate on the pulp is by no means decided yet and he advises the use of zinc phosphate cement for lining deep cavities.

(3) One minor point that has been reported is that apparently there is no reaction on the part of the patient to an acrylic filling as is sometimes found when silicate restorations are introduced into cavities.

(4) There is a tendency to shrink during hardening so that, besides a thick mix, positive pressure should be applied during the setting. As is the case with acrylic dentures, shrinking is offset in some measure (some manufacturers claim fully for their product) by the subsequent expansion (up to 0.5 per cent.) when the restoration absorbs moisture from the saliva. It is considered that more clinical evidence is required in this connection.

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14. A.D.A. Council on Dental Research.—Statement on direct resinous filling materials: J.A.D.A., 40:243, 1950.
15. Ellis, R. G.—Lecture to Victorian Branch, A.D.A., 15th Aug., 1950.

(5) Unlike cements, porosity frequently develops in these restorations but it is not a serious factor if it is confined to the centre where it is unlikely to be exposed.

(6) Aesthetically acrylic resins offer more scope than silicate cements. The plastic should be much more resistant to surface staining although it may be subject to certain types of discoloration. The impermeability of the material should be an added advantage. Any stains should be confined to the surface.

(7) The acrylic restoration is not soluble in saliva nor is it susceptible to attack by the lactic and other acids as is the case with silicate cements.

(8) The resultant filling is not nearly as hard as silicate cement. A Brinell Hardness Number of 13 $\pm$ 2 for the direct filling compared with 19 $\pm$ 1 for an inlay has been reported[16]. Silicate restorations have a hardness of about 70. The acrylic restoration therefore may be easily cut or scratched inadvertently by instruments and abrasives. On the other hand, acrylic resin is not nearly as brittle and has a superior toughness.

(9) The thermal expansion of silicates is similar to that of the tooth enamel whereas that of acrylic resin is greater, but whether this plays a significant part clinically is difficult to say.

(10) Acrylic resin can be successfully polished whereas finishing of silicate cements is a doubtful practice.

On the whole, plastic acrylic restorations seem to have an assured future once the techniques have been mastered. With acrylic inlays probably the biggest hindrance has been retention, but with an undercut cavity permissible with the direct restorative material this difficulty vanishes.

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16. Skinner, E. W. and Cooper, E. N.—J.D. Res., 23:198, 1944.

PREVENTIVE PERIODONTIA*

R. TOMPSON, B.D.S.

The field of Preventive Dentistry has received an ever-increasing amount of attention in the last few years, but it seems to have been concerned primarily with the subject of dental caries. This problem has been tackled with energy by numerous enthusiastic research workers and it is pleasing to note the progress of their work; but what of periodontal disease?

There can be little doubt that among adults far more teeth are lost through periodontal disease than through dental caries. It would appear, also, that more ill-health is caused by periodontal disease than by periapical infection arising from dental caries. If these premises are accepted, the importance of the task of the prevention of periodontal lesions becomes apparent. Furthermore, this task is one which we as a profession must not shirk. What is the use of lavishing the greatest care on the teeth themselves in an effort to preserve them if at the same time we neglect or overlook the surrounding and supporting tissues? Yet this is precisely what often happens.

Organised research into the problems of periodontal disease needs to be greatly extended, in the hope that ultimately a solution to the problems will be achieved. In the meantime, however, the dentist in his everyday practice can do a great deal to reduce its incidence.

THE PRACTICAL ASPECT OF PREVENTION.

The aetiology of Periodontosis (or Diffuse Atrophy) is unknown. Therefore, although successful treatment of this disease is often possible, its prevention, in the light of our present limited knowledge, is not. Fortunately, however, enough is known of the aetiology of the type of lesion commonly known as Pyorrhoea to justify the belief that this type is largely preventible; for, while diet and certain systemic factors undoubtedly influence susceptibility to this disease, it is generally accepted as essentially of local origin.

The most important factors in the prevention of pyorrhoea are:—

1. Oral hygiene.
2. Function.
3. Avoidance of mechanical irritation.

I have purposely omitted nutrition from this list in the belief that insufficient is known of its effect on the periodontal tissues to justify its inclusion. It is, of course, beyond dispute that gross vitamin deficiencies, for example, can seriously affect periodontal health; but gross deficiencies are rare in this country. On the other hand, there is no evidence that moderate or sub-clinical nutritional deficiencies are largely responsible for pyorrhoea.

The texture of the diet is in an entirely different category from its nutritional value and has an important bearing on both hygiene and function; but I believe that it is not in our power to change radically the physical nature of the average person's diet.

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*Read at the Twelfth Australian Dental Congress, Sydney, August, 1950.

Since lack of oral hygiene appears to account for most cases of periodontal disease (90 per cent., according to Gottlieb), it is imperative that the individual members of the dental profession attempt to improve the standard of oral hygiene in their patients, in order to prevent the excessive loss of teeth and the ill-health resulting from this extremely common disease. The New South Wales Branch of the Australian Dental Association, through its Dental Health Education Department, is doing as much as its limited resources will allow, while some really excellent work is being done by the Queensland Health Education Council with the co-operation and assistance of the Queensland Branch of the Association. It is only through individual effort, however, on the part of practising dentists that anything approaching the ideal can be attained.

To achieve this objective within the limits of one's own practice requires patience and care, but results are well worth the effort entailed.

Instruction in Oral Hygiene.

Teaching oral hygiene is not difficult or tedious with most patients. It appears best to follow a definite plan of procedure, as follows:—

Firstly, with the aid of a hand-mirror, show the patient some visual evidence of the food debris in his mouth, since many people need to be convinced that their teeth are not clean. This can quite easily be done, without giving offence, by pointing out that the patient's efforts have not been well-directed. The opportunity should be taken at this stage to explain, in simple terms, the causal relationship between inadequate hygiene and both caries and pyorrhoea.

Secondly, detailed instruction in methods of cleaning must be given. There are several available techniques, each of which has many advocates. The method generally advocated by the American Dental Association appears to be a modified form of the Stillman method, consisting essentially of directing the bristles towards the gums and then, with a slight vibratory action, moving them towards the incisal or occlusal surfaces. In this way, it is claimed, the interdental spaces are cleaned, while the gums receive a certain amount of massage. Another popular method is that known as the "Charters," wherein the bristles are directed away from the gums and several small vibratory movements are made. The brush is then lifted away from the teeth and again applied to the same position, whereupon the movement is repeated. This procedure is repeated three or four times. The Charters method gives excellent results in some hands, but many of its exponents admit that is it difficult to learn.

The method which I personally prefer is as follows:—The bristles are directed at right angles to the teeth, at the same time covering the gingival margins. Firm pressure is applied, thus wedging some of the bristles into the interdental spaces and compressing the tissues at the gingival margin. While maintaining this pressure, the brush is then swivelled around vigorously through a small circle, using as a pivot the bristles which are wedged in the interdental spaces. These bristles must be kept in place throughout the entire movement and sufficient agitation given them to clean the interdental spaces.

The sweeping movement made by the bristles which overlap the marginal gingiva cleans and stimulates it. The merits of this method lie in the fact that it is simple, yet effective and safe.

Desirable Characteristics of the Toothbrush.

It is extremely important to use a brush which is not too hard. There is no unanimity of opinion as to the relative merits of nylon and the natural bristle, but I prefer nylon because its physical properties are less variable. Being very nearly impermeable to moisture, it retains its physical characteristics throughout its useful life. Nylon filaments do not soften much, but after a certain amount of use they splay out to either side. When the brush thus loses its correct shape, it should be discarded.

The so-called "hardness" of a nylon brush depends on the length, diameter, and spacing of the individual nylon filaments. The most variable of these features among the present day brushes marketed in Australia is the diameter, which ranges from .26 mm. to .36 mm. The finest of these gauges is just about ideal, since it is quite rigid enough to clean the teeth efficiently, whilst being flexible enough to permit vigorous use of the brush without danger of injury to either teeth or gums.

As for the other physical characteristics of the brush, it is generally agreed that the head should be short (no more than an inch in length) and should consist of fairly widely spaced tufts of "bristles" set in two or three rows each containing six tufts. It is also generally agreed that the surface of the brush should be flat. Finally, the "bristles" should be half an inch or a little less in length, with the end of each tuft tapered in such a way as to permit penetration between the teeth.

The correct use of the toothbrush is undoubtedly of great value. If used regularly and efficiently immediately after eating, it will prove a very effective weapon in the control of dental caries; whilst as an instrument fulfilling the dual purpose of maintaining oral hygiene and providing the mechanical stimulation which should be derived from natural function, it constitutes our first line of defence against gingivitis and pyorrhoea. This mechanical stimulation not only promotes circulation but also increases keratinisation of the gingival epithelium, which is thereby made tougher and stronger. As a result, the resistance of the tissues to bacterial invasion and to mechanical injury by occasional sharp particles of food is greatly increased.

The Importance of Function.

Toothbrush massage has been made necessary by the refinement of modern foods. It is because of this lack of texture that modern diet fails most lamentably. Nutritionally, the average diet in this country is usually adequate, but from the point of view of texture as it affects the teeth and periodontal tissues it is deplorable. However, since it is idle for us to attempt to revolutionize the diet, we must resort to an artificial means of replacing this lost function.

To a certain extent natural function of the teeth can be improved, even under the adverse conditions imposed by present day diet, by a deliberate attempt to chew vigorously. The softness and fineness of the food places a very definite limit on the amount of benefit obtainable in this way, but it is

well worth encouraging. The inclusion in the diet of as much coarse, crisp, and tough fibrous food as possible should also be encouraged. Food should be eaten raw where practicable, or cooked as little as possible.

Avoidance of Mechanical Irritation.

The third important factor in the prevention of pyorrhoea is the avoidance of mechanical irritation. The chief cause of this is sub-gingival calculus. The teeth must be kept free from this deposit since, by maintaining constant irritation of the epithelium lining the gingival crevice, it produces ulceration. It has never been satisfactorily established whether the origin of sub-gingival calculus is the same as supra-gingival calculus. If the sub-gingival type is deposited as a result of inflammation in the gingival tissues, its accumulation will automatically be prevented by keeping these tissues in a state of health. At any rate, there can be no disputing the fact that its presence causes serious irritation of the soft tissues and therefore brings about an accentuation of the existing inflammation.

Another source of mechanical irritation of the gums is the overhanging margin of a dental restoration. Every effort must be made to prevent any surplus filling material from remaining at or under the gingival margin, and any overhanging margins detected in the examination of a mouth should be removed.

Absence of contact between a restoration and the adjacent tooth is another likely source of irritation, since it allows food to be packed into the interdental space, where it usually remains under pressure. Even if actual contact with the neighbouring tooth exists, deficient contour on the buccal or lingual side of the contact point will often allow the impaction of food in the interdental space. Correct contour at all points is essential, although occasionally it may be necessary to increase the contour slightly if the teeth have drifted apart a little.

Partial dentures can be a serious cause of mechanical irritation of the gingival margins, and special attention should therefore be given to their design in reference to their effect on the periodontal tissues.

Elimination of Early Gingivitis.

So far we have discussed the prevention of gingivitis and periodontal disease by methods designed to *maintain* periodontal health. When a mild gingivitis already exists, with the usual sub-gingival calculus and oedema of the interdental papillae, preventive treatment is still possible, since up to this stage no permanent changes, in the form of alveolar bone resorption, have occurred, although this will inevitably take place if prompt action is not taken.

In most cases there is some bleeding when the brush is applied to the gums, in which case the patient will probably carefully avoid them in future and take no action whatever. On the other hand, he may consult his dentist, whereupon he is likely to receive little treatment but an astonishing variety of advice. This will include the use of a softer brush, massage with finger or cloth, painting with various drugs, the use of different mouthwashes and instructions to "massage the gums with the toothbrush," which is certainly nearest the mark but unfortunately very inadequate. I am not suggesting that

correct and adequate advice is never given nor appropriate action ever taken, but I regret to say that such advice and action appear to be comparatively rare.

If the gingivitis is allowed to continue or is incorrectly or inadequately treated, it is only a matter of time before it leads to pyorrhoea. As the crevicular epithelium becomes detached from the tooth, and the gingival crevice becomes correspondingly deeper, the tendency to bleed may become less noticeable or may disappear altogether, for the location of the ulcers often changes from just inside the gingival margin to a point near the base of the pocket.

A careful examination in such a case would almost certainly reveal the presence of sub-gingival calculus, thorough removal of which is usually followed by a rapid healing of the minute ulcers already referred to, whereupon the tendency to bleed disappears rapidly. There is also a great improvement in the tone and colour of the gums, which become firmer and tighten up around the necks of the teeth.

This looks, then, like an easy cure; but if nothing further is done, within a few months a fresh deposit of sub-gingival calculus will occur so that, before long, the gums will be in as bad a condition as before. Sub-gingival scaling will again temporarily relieve the gingivitis, but a further recurrence is inevitable.

Training in Home-care.

If inadequate function produces this ultimate result, what steps can we take to provide the degree of function necessary for the maintenance of gingival health? A return to a primitive diet would probably provide the solution. In a society such as ours, this is hardly possible. The only alternative is a high degree of oral hygiene and mechanical stimulation supplied by medium of the toothbrush, and interdental stimulation with a wooden or rubber stimulator.

If a person were adequately trained at an early age in the technique of oral hygiene and gingival stimulation, it is a fair assumption that he could avoid the occurrence of gingivitis, temporarily relieved by sub-gingival scaling and followed by an early recurrence of the gingivitis—and so on, until the ultimate loss of teeth becomes inevitable. The improvement in gingival health resulting from a thorough sub-gingival scaling is often spectacular, but unfortunately it does not last unless action is taken to prevent the conditions which gave rise to the calculus in the first place. Such action necessarily involves detailed personal instruction, not merely a vague reference to the required home-care. The dentist should make sure that his patient fully understands the correct toothbrush technique by personally training him in such methods.

The Role of Surgery in Preventive Periodontia.

One is frequently confronted with a patient in whom hyperplasia (as distinct from oedematous swelling) of the gingival margins has resulted from long-standing chronic marginal gingivitis. In such a case purely conservative

measures will not suffice, since the hyperplastic tissue is of course fibrous and therefore cannot readily be dissipated by means of hygiene and mechanical stimulation. Because the presence of this tissue increases the depth of the gingival crevice, it often makes the cleaning of the crevice impossible, with the usual result of gingival detachment, bone resorption, and pocket formation. Once established, the pocket inevitably progresses to the point where radical surgery or the loss of the tooth becomes necessary.

This stage need not, however, be reached if preventive measures are taken in time. Such measures are less conservative than those which I have so far discussed and consist essentially of the restoration of gingival form by surgical means. The object of restoring the normal gingival form is, of course, to eliminate the early pocket or abnormally deep gingival crevice before bone resorption has had time to occur. It is a simple operation, requiring no more than ordinary skill and judgment, and causes the patient very little, if any, post-operative discomfort.

A very common condition which often leads to pocket formation and bone resorption is the enlargement of the papillae between the molars, followed by a splitting into two separate (buccal and lingual) portions with a cleft between them. This contrasts with the normal shape, which consists of two inclined planes (buccal and lingual) meeting at an apex in the centre of the interdental space.

This interdental cleft is frequently the beginning of what ultimately becomes a deep pocket. It is often disregarded in its early stages, when prevention is easily possible. All that is required is to restore the papilla to its original shape by excision of the buccal and lingual portions, followed by instruction in interdental stimulation. In many cases only one side of the papilla may be enlarged, necessitating the removal of that section only.

A careful examination for potential pockets of this type should be regarded as an essential part of a complete dental examination. Any gingival crevice deeper than two to three millimetres should be restored to its normal depth of one to two millimetres, if considered advisable. In certain positions such as the labial surfaces of the anterior teeth, provided that the standard of hygiene is satisfactory and there is no sign of ulceration of the epithelium lining the crevice, a depth of three millimetres can be quite safe; if, on the other hand, sub-gingival calculus is present in such a crevice and one is at all doubtful about the patient's ability or determination to keep it perfectly clean in future, one should have no hesitation in reducing its depth to a minimum by means of excision or electro-coagulation.

Any crevice of a depth greater than three millimetres is extremely difficult to keep clean. Therefore, steps should be taken to make it as shallow as possible. Such action is consistent with the principles of Preventive Periodontia.

Vincent's Infection.

A word must be said about Vincent's Infection. Too often is this disease treated purely as an acute infection, the treatment being considered complete with the elimination of the typical signs and symptoms. Frequently, after the

cessation of treatment a chronic infection remains which may again develop into an acute condition. With each recurrence of the acute stage of the infection a further destruction of the interdental papillae occurs, followed by increased resorption of the alveolar crest; thus, quite deep interdental pockets are eventually established.

Such an event can quite easily be prevented by prompt action to eradicate the incubation areas at the time of the initial infection. This consists of the total elimination of pockets, no matter how shallow, and very thorough instruction of the patient in the principles of oral hygiene and gingival stimulation. Supervision of the patient's home-care for a requisite period is, of course, essential.

Vincent's Infection very seldom occurs in a clean and healthy mouth even when, for example, nutritional deficiency exists. If every member of the public received, and faithfully followed, instruction in oral hygiene, this disease would be comparatively rare.

Prevention and Correction of Irregularities in the Dentition.

The effect of overcrowding and irregularity of the dentition in producing conditions favourable to the retention of food debris, thus increasing the difficulty of cleaning the interdental spaces, is so well-known as to require very little emphasis.

Much of this overcrowding can be prevented by preservation of the deciduous dentition and by the provision of space-maintainers where necessary; while, if malocclusion and overcrowding have already occurred, suitable orthodontic treatment will (among other things) eliminate many sites of food impaction or retention, thereby assisting the patient considerably in the task of maintaining oral hygiene. Natural function, so important to the preservation of a healthy periodontal state, is also aided by the restoration of normal arch form and occlusion resulting from orthodontic treatment.

Faulty Prosthesis and Periodontal Disease.

An important field for observance of the principles of prevention in periodontal disease is Prosthetic Dentistry. How many partial dentures are handed to patients without any sort of instruction in the care of the soft tissues? How many dentures are designed without regard for the harm that they will almost certainly cause to the gingival margins? It is obviously useless to replace missing teeth with an appliance which will itself ultimately cause the loss of the remainder; yet it would not be an exaggeration to say that the majority of partial dentures do that very thing.

Many poorly designed dentures destined to do an incalculable amount of harm to the remaining natural teeth are still being made. Teeth quite incapable of taking the strain are used as abutments; wrongly designed clasps are applied in such a way as to weaken and loosen teeth which would have been quite capable of carrying a properly designed retainer; occlusal rests are placed in positions where they should not be used; gingival margins are covered and their circulation impaired by dentures which should have been designed to leave the gingival margins free; and tissue-borne dentures are

inserted without any advice about future re-lining, with the result that in many cases the gums are driven away from the necks of the teeth and extreme bone resorption is caused.

Conclusion.

Most periodontal disease is preventible, but the practical application of the simple preventive principles involved requires co-operation between both dentist and patient. It is the dentist's responsibility to take the initiative in this co-operative effort.

WHAT THE PARENT WANTS TO KNOW*

SUE HULL, B.D.S. (SYD.).

These questions have been selected rather as ones which require the dentist to stop and think before replying. The answers themselves make no claim to be original. My hope in supplying them is that it may save the busy practitioner time in mentally reducing the current literature to a form suitable for every-day application.

Question 1.—*What effect will my diet during pregnancy have on my baby's teeth?*

In most cases this question can be answered in a single sentence—"If an expectant mother follows an adequate diet during her pregnancy, such as will be recommended by her doctor, such a diet will also be adequate to promote the proper development of her baby's teeth."

The actual types of food and the quantities which should be consumed during pregnancy are the doctor's province, and it is from this source that most mothers seek advice on this subject. However, the question of calcium, which seems to be a well-known and ever-popular substance with the community, is often referred to the dentist.

In this connection I don't think I can do better than quote from Samuel M. Gordon's article, "Caries in pregnancy."[1]

> "Calcium and phosphorous are essential elements. All requirements for average needs, including pregnancy and growth, may be suitably obtained from an adequate diet. There is no carefully controlled evidence that addition of calcium and phosphorous compounds, inorganic or organic, promotes retention of these elements and hence freedom from dental caries except in known cases of deficiency. Where this occurs milk serves as an excellent source of calcium and phosphorous in a readily assimilable form.
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> "In rare conditions such as osteomalacia, parathyroid tetany and some conditions of pregnancy which may require it, additional calcium can be supplied by such simple compounds as the chloride, lactate and gluconate. But this administration does not overcome the cause. These conditions may require medication with parathyroid extract or Vitamin D.
>
> "There is no evidence that ingestion of calcium and phosphorous combinations in addition to diets adequate in these elements promotes the development of sound teeth in the human fœtus."

In the same articles he mentions that the calcium requirements of nursing mothers are high. Macy[2] and others found that a daily feeding of codliver oil and yeast during the period of highest milk flow resulted in greater calcium and phosphorous utilization, indicating that Vitamin D is also important.

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*Read at the Twelfth Australian Dental Congress, Sydney, August, 1950.

1. Gordon, S. M.—Dental Science and Dental Art, Philadelphia, Lea & Febiger, 1948.
2. Macy, I.—*et al.*—J. Biochemistry, 86:59, 1930.

Hess, Lewis and Roman[3], after many chemical and X-ray studies of the teeth of infants from birth onwards, have made the following conclusions:—

1. Calcification of the teeth must be regarded as important only after birth.

2. At birth only half a gram of tricalcium phosphate has been laid down in the teeth, and the early years after birth are the periods of greatest significance in regard to calcium and phosphorous requirements of teeth.

3. As far as the teeth of the infant are concerned, it cannot be of great importance whether throughout pregnancy a woman has a diet high in calcium and phosphorous as she has bounteous storehouses of these substances in her bony skeleton.

As regards the role of vitamins during tooth development the following conclusions were agreed upon at the Michigan Workshop[4]:—

1. Chronic mild deficiencies of Vitamin A have no significant effect on the structure of the hard tissues or the shape of the teeth. However, chronic severe deficiencies of Vitamin A produce characteristic abnormalities in the structure and form of the enamel and dentine of the developing teeth of animals.

2. There is no evidence in the literature that a deficiency of Vitamins B and C have an effect upon the developing teeth of man.

3. It has been rather clearly demonstrated that Vitamin D is of value in the formation of the hard dental structures, including the teeth themselves, and there is evidence to suggest the possibility of increased susceptibility to caries in teeth which have been formed during a condition of Vitamin D deficiency.

Finally, I have not forgotten the addition of optimal amounts of flourides to the public water supplies. This is already being done in some American communities, and promises to be an increasingly important factor in the effect of diet on caries-resistant teeth.

In brief, then, a diet which safeguards the general health of mother and baby will also be adequate for the developing teeth.

Question 2:

In considering the eruption of the primary dentition . . . teething, to parents . . . it may seem to you that I am again trespassing on the doctor's preserves. I included this question because I think that every dentist should be equally conversant with the mechanism, possible systemic effects and management of teething, both for his own satisfaction, and for the satisfaction of his patients who may also be parents.

My next question, therefore, reads:—

"Is it normal for a baby to suffer any pain or general disability during teething, and how can we assist him during these times?"

One of the parents' greatest problems at these times—apart from the problem of getting a little rest themselves—is how to distinguish what

3. Hess, A. G., Lewis, J. M. and Roman, B.—Dent. Cosmos, 74:1053, 1932.
4. Easlick, K. A.—Dental Caries, St. Louis, The C. V. Mosby Co., 1948.

symptoms are normal, unimportant and perhaps inevitable from those which demand the immediate attention of the doctor.

Now while some babies' teeth emerge completely unheralded, others are ushered in by quite distressing symptcms, and why this variation should be so, I can find no clue. But, although this wide range of disabilities has been definitely related to teething and the mechanism by which this occurs is fairly well understood, it is desirable to warn parents against the practice of attributing all the ills of babyhood to teething and to advise them to seek the doctor's aid when in doubt.

In regard to the mechanism by which teething produces systemic effects, Edward Kirk[5], in his article, "The Nervous Reflexes of Dentition," refers to what he calls "the dentitional equilibrium." He says: "This harmonious synchronisation between root growth and tissue absorption is a delicately balanced mechanism, a sort of moving equilibrium, dependent for its stability upon the nutritional and physiological balance of the entire infant organism."

If this delicate balance is upset, a continued physical irritation of the dental peripheral terminals of the trigeminal nerve occurs and a wide variety of reflexes may occur.

Eric Pritchard[6] says in his book, "The Infant—a Handbook of Modern Treatment":—

> "During both primary and secondary dentitions there is often a good deal of inflammation of the gums owing to tension caused by erupting teeth. Either reflexly or by irradiation a considerable reflection of the nervous system results which may be reflected in almost any direction and manifested most acutely in those nerve centres which are most unstable. This accounts for the great variety of symptoms which may occur during dentition."

In mild cases the symptoms of teething may consist of irritability and fretfulness and disturbed sleep lasting two or three days and disappearing when the tooth penetrates the gum. Actual inflammation of the gums can be seen, together with increased salivation leading to dribbling. It is quite common to see the child cramming its fists or toys into its mouth or continually rubbing its head on the pillow.

In more severe cases two or three degrees of fever may be present which falls with the eruption of the teeth. Other systemic disturbances may include diarrhœa, vomiting and constipation and even convulsions.

Locally it is quite common to find increased secretion from mucous membrane of the nose which is often mistaken for a cold and also lachyration. Dilation of the capillaries of the cheek due to a vaso-motor reflex, also pimples on the chin and eczema behind the ear may occur.

All these symptoms, both local and systemic, are fully dealt with in the available literature. The instructions for coping with the situation are unfortunately far less numerous.

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5. Kirk, E.—Dent. Cosmos, 62:1373, 1920.
6. Pritchard, E.—The Infant: A Handbook of Modern Treatment, ed. 1, London, Edward Arnold & Co., 1938.

One author suggests rubbing the gums with orange juice, but the general consensus of opinion seems to be against any local treatment and feels that the safest way to prevent possible infection is to leave the gums alone and merely see the baby has something clean to chew, either smooth bones, rusks or a clean, smooth toy.

Lancing the gums is not generally considered necessary or advisable, as it is felt that the tougher scar tissue will grow back over the tooth before it has time to erupt through. However, in some cases the eruption of a tooth, usually a molar, is unduly prolonged with concurrent rise in temperature, loss of weight due to refusal of food and in these cases, providing the tooth is close enough to the mucous membrane, lancing will give relief.

The general treatment during difficult teething is to reduce the irritability of the central nervous system. Sedatives such as chloral or phenazone may be used, but aspirin is probably equally effective. The dose is one-third to one-half of one aspirin according to the age of the child.

Feeding problems often arise during teething. The soreness of the gums often causes the child to refuse food with consequent loss of weight. At these times a child still having a bottle will sometimes prefer to take food from a spoon.

If all types of feeding are refused and the child ceases to gain its normal amount of weight per week this will probably be compensated for in the following weeks when no teeth are erupting.

The parents should be advised not to force food on the child at these times when its mouth is sore, as the pain may cause the child to dislike the process of being fed, and subsequently become a "difficult feeder."

As regards the proprietary lines of teething powders available, both Nyal and Steedman's contain calomel and Ashton and Parsons contains matricasia, so that it can be seen that these are intended as aids to bowel action and stomach upsets and not as sedatives.

Davis Powder, however, also contains a sedative.

I could well summarize this question with the advice given me on this subject by a well-known Sydney pediatrician: "Very many children suffer in various ways during teething," she said. "The best thing you can do for them at these times is leave their mouth alone, give them some Aspro when necessary, and don't force them to eat."

Our problem child has now been safely born and lived through the eruption of its deciduous teeth, but the parents' troubles seem to be just beginning.

Their next question to the dentist is:—

Question 3.—*Should an attempt to made to control habits such as thumbsucking, and, if so, at what age?*

That thumbsucking, and allied habits such as finger-sucking and lip-biting, can cause dental deformity when carried out continually and excessively is no longer a matter of question for the dental profession. The associated deformities are familiar to us all.

Parents, however, have a knowledge of these facts usually limited to secondhand rumours, and their observation of the incidence of thumbsucking and its consequent results is naturally confined to their own children and immediate family. Thus, if on occasions they notice their own child sucking his thumb they are not, in most cases, in a position to judge if this habit is likely to have any general or dental significance.

Confronted with a query of this nature the dentist's first job is to ascertain, by questioning the parent, the extent of thumbsucking indulged in by the child. And I feel that, if this amount turns out to be normal—or perhaps a safer word would be "usual"—that is occasional or incidental thumbsucking, with no apparent results on the dental mechanism, then the best thing to do is to ignore the habit completely.

The question now arises—how much thumbsucking can be considered insignificant in various age groups?

During the first months of the baby's life, while it is breast- or bottle-fed, sucking is a normal and reflex action. Oral sensation is very important at this age, and the mouth is the normal avenue of exploration of new objects, in the same manner that the hands and eyes are used in later life. Thus mouthing of objects and occasional sucking of fingers and toes can be disregarded at this age. However, continual thumbsucking during a large part of the waking time is a different story and will be considered presently.

Considering now the pre-school child, normally the sucking instinct is in the process of disappearing or being replaced. However, this process is not complete in many children, and these may be observed to suck their thumbs on occasions only such as when falling asleep, when overtired, or perhaps when absorbed in a story. Provided no dental effects can be observed, I feel these occasional thumbsuckers can be ignored.

However, in the child of school age, and especially by the age of eruption of the permanent incisors, the story is different.

If thumbsucking has not completely disappeared by this age, it either indicates persistence of a strong habit formed during early childhood or occurs associated with other indications of psychological and emotional immaturity. At this age it can never be ignored.

Supposing now we find that the thumbsucking occurs to what we consider a possibly serious extent. What extent of damage to the teeth can we indicate to the parent may be expected if the habit continues?

Before the eruption of the deciduous teeth, no amount of thumbsucking can have any harmful effect as far as dental development.

After eruption of the deciduous teeth, if the period of thumbsucking is prolonged and the pressure of the thumb is heavy, the labial placement of the maxillary teeth and possibly also labial movement of the maxillary alveolus and depression of the mandibular incisors may occur. Sillman in 1942[7] showed that spontaneous correction of this condition occurred in about 75 per cent. of cases when thumbsucking ceased or was stopped. In the cases where spontaneous correction does not occur, it is thought that thumbsucking may be only a contributing cause to some underlying growth factor.

7. Sillman, J. H.—Am.J.Orth. and Oral Surg., 28 197-209, 1942.

If thumbsucking ceases or is stopped before the eruption of the permanent teeth their position should be unaffected, but if it continues during the period of mixed dentition serious and not infrequently lasting effects may be observed.

Finally, we come to the parents' natural question—how can we attempt to control this thumbsucking?

Thumbsucking in the baby is, fortunately for us, a question for the pediatrician, not the dentist. Briefly, it seems to be connected with insufficient feeding or insufficient sucking during feeding. This aspect has been thoroughly investigated by Dr. Lawes[8]. However, if the habit can be prevented at this age it may save the dentist and parent much future worry and work.

The pre-school child who is a confirmed thumbsucker is possibly bored, unhappy, insecure, or feels unwanted or unloved. Removal of these causes is the soundest basis for treatment, though it is realized this may be extremely difficult. More time and attention from the parents and better playing facilities are by no means always easy or even possible to obtain.

One of the greatest hopes in these situations is that when the child starts kindergarten the new activities and interests may divert him from this habit.

A different approach is used to older children, and here the dentist can be a more helpful and deciding factor. A personal approach to their problem, a kindly explanation and demonstration of the effects is appreciated where scolding proves useless. Dr. Lawes has suggested that the child may be persuaded to substitute chewing gum for thumbsucking with the great advantage of causing no harmful effects on the occlusion.

Maury Massler[9], in his excellent article on thumbsucking, emphasizes that the habit is not, and should never be made, a moral issue. The dentist helping the child achieve success in his own desire in overcoming the habit should be the dominating note.

As regards appliances, whether elbow splints, bitter aloes or lingual bars, they are in general considered inadvisable, as the frustration caused by forcible prevention may lead to greater evils. Occasionally, they may assist in older children where instituted with the child's own approval and co-operation.

You may be interested in some statistics from the Lady Gowrie Centre[10]: between two and three years 13 per cent. of the children were recorded as thumbsuckers, the same percentage between three and four years, 9 per cent. up to five years, dropping to 4 per cent. between five and six years. From these figures the interesting fact appeared that the number of thumbsuckers whose health was listed as "not consistently satisfactory throughout" was highly significant. Unfortunately, no follow-up of these cases is possible in later life but, from examining the children at the Erskineville centre, I found it possible to detect a significant number of the persistent thumbsuckers by their typical tooth arrangement alone.

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8. Lawes, A. G. H.—Dent.J.Aust., 22:167-194, 1950.
9. Massler, M. and Wood, A. S.—J.Dent. Children, 16:1-8, 1949.
10. Hill, E.—The Lady Gowrie Centres, 1936-1946, Canberra, 1946.

Question 4.—At what age should the child first visit the dentist, and is any care of the mouth necessary, prior to this time?

The child patient's reaction to dental visits is most likely to be favourable when the first visit or several visits take place before any operative work is necessary. A background of several visits devoted to examination and prophylaxis only greatly increases the child's confidence so that when a restoration becomes necessary it is usually accepted with good grace. A child brought to the surgery suffering from toothache and needing one or more immediate extractions will be a very different story.

I feel that 3½-4 years of age should be recommended to parents as the age for the first dental visit. I know that some authorities and most public health books and pamphlets recommend an earlier age. I know that in a small percentage of children caries does occur before this age. Nevertheless, I feel that most children below this age have insufficient reasoning power and self-control for the dentist to make what we might call a "social success" of a visit. And if the child cries and fights at the first visit, an "anti-dentist" attitude will be developed which, even at this early age, may colour the child's view of dentistry throughout his whole life.

Prior to the age of 3½ years the parents should be advised to examine the child's teeth themselves from time to time. Up to this age any cavities that do occur will, in all probability, be occlusal cavities, and thus fairly easily seen by the parents. Where the parents suspect a cavity the child can be brought to the dentist at once. Remember that the only likely situation for proximal caries in the deciduous teeth is between the first and second deciduous molars and, as the second molar does not appear in the mouth until about the age of two, caries at this contact is unlikely for some time after this.

Before the age when caries becomes a major problem, infection of the mucous membrane of the mouth may occur in young children, at any age, from birth onwards. Such conditions as Vincent's Infection and Thrush are comparatively rarely seen in infants from better-class homes where the diet is good and principles of hygiene are observed. Quite a few cases are seen in poorer districts, and more are brought to public hospitals for treatment.

Thrush, as you know, is caused by a species of *Monilla*. This mould grows readily on the mucous membrane of the mouth, especially when damaged by mechanical means, such as thumb or dummy sucking or frequent washing of the mouth by the parent . . . which, incidentally, is not advised for small children. Investigation of these cases of Thrush often shows that lack of cleanliness is responsible, for example, omitting the regular boiling of bottles and teats, or other feeding equipment.

For the treatment of Thrush, one author recommends the use of Monsol, 1 in 400, while glycerine and borax is also in common use.

Virgil Cheyne[11] emphasizes the importance of systemic treatment in mouth infections. He writes:—

"Most Vincent's cases are handled routinely by systemic medication (penicillin or sulphanilamide) and/or nutritional correction, working in

11. Cheyne, V.—J.Dent. Children, 14:2-5, 1947.

league with the pediatrician. At a rough guess, 95 per cent. of the cases of oral infection occur as part of a generalized malnutrition picture. Soft diets, high in protective food factors, administered by the persistent hands of capable nurses to hospitalized children, solved most of our problems of oral infection. That includes Thrush, Vincent's Infection and aphthous ulcers. We have had little success in treating such cases by local medication if we do not at least do a follow-up search in systemic factors."

Advice on the prevention and treatment of mouth infections is only necessary to a small minority of parents of the under-four-year-olds.

The routine advice, on toothbrush technique and dietary considerations, given by the dentist is of major importance during these years and, I am convinced, plays an important part in the child's dental health.

While I feel it is quite unnecessary to elaborate on toothbrushing technique, there is one point I would like to make.

"At what age can a child be trusted to brush his own teeth effectively?"

I think this age is much later than is usually imagined by parents, and that the only way for them to ensure that their child has not only brushed his teeth but has got some value from the brushing is to take the responsibility for this themselves and make periodic checks on their child's toothbrushing, if necessary, until that child is in its teens.

Otherwise we find that a brisk swipe across the occlusal surfaces, together with a fair amount of splashing for sound effect, enables our child patients to answer, with righteous indignation, that they "always clean their teeth."

If advice has been given by the dentist along these lines—that is, regular inspection by the parent, the proper method of home care, and diet from the dental point of view—and carried out by a co-operative parent, when the child visits our surgery at 3½ to 4 years, only occasionally will more than a preliminary examination and prophylaxis be necessary.

My next question is really a double one:—

Question 5.—Does heredity influence the teeth, and do the deciduous teeth have any relation to, or influence on, the permanent teeth?

Rather a favourite question, this one, with parents—especially about 5 o'clock—and, unfortunately, impossible to answer "yes" or "no."

Regarding the hereditary factor, I can find no evidence that caries susceptibility or immunity is likely to be transmitted from parent to offspring. On the contrary, some observations on identical twins have shown a marked difference in the caries susceptibility.

On the other hand the hereditary factor seems to play a part in the arrangement of the teeth and development of the jaws. Ernest Otterholt[12] in 1946 writes that, while prognathism and retrognathism can develop under influence of local causes, they are often hereditary. He quotes for example a study of the House of Hapsburg, where mandibular prognathism occurred with nearly 100 per cent. regularity in the affected branches of the family. He concludes that the hereditary factor seems to be irregularly dominant.

12. Otterholt, E.—Northwestern Dent.J., 25:95-97, 1946.

One other condition in which heredity seems to play some part is congenital absence of teeth. It has been pointed out by orthodontists, however, that some cases of malocclusion, which at first appear to be hereditary, are actually due to the repetition of some habit, which the child has imitated from one of its parents.

The relationship of the deciduous teeth to the permanent teeth covers a widespread field, including calcification, caries susceptibility, occlusion, periapical involvement and anomalies.

The parents who ask this question are probably thinking in terms of caries, and we are justified, I think, in answering that the caries immunity or otherwise of the deciduous teeth is no real indication of the subsequent immunity of the permanent teeth. The reason for this is that so many conditions in the mouth are changing during the period of mixed dentition.

The child at this time is leaving kindergarten to start primary school, so that his dietary habits change as home influence gives way to outside influence. Lactobacillus counts at this age very frequently indicate a considerable change in the saliva. Even the teeth themselves, having been formed at a different stage of nutritional development, probably differ in structure from the deciduous teeth.

For this reason, where other deciduous teeth were hypoplastic it is unlikely that the permanent teeth will correspond unless, of course, the condition was due to some systemic abnormality which is still operating. An X-ray of the developing teeth will settle this question and reassure the parent.

The effect of early loss of deciduous teeth, loss of mesio-distal diameter, etc., on the occlusion of the permanent teeth, is of as much interest to parents as the results are correspondingly expensive. However, in this company, I feel that no further mention of the importance of the primary teeth as space maintainers need be made.

A very interesting contribution to this subject was made by William Bauer[13] in 1946 in an article entitled "The effect of periapical processes of deciduous teeth on the buds of permanent teeth." The following is a summary of his findings:—

> "The examination of autopsy material containing deciduous teeth and their successors showed that periapical processes of deciduous teeth failed to stimulate the development of a fibrous wall which could localize lesions. They spread diffusely through the bone marrow, towards and around the buds of the successors, thereby affecting the important protective layer of young enamel, the united enamel epithelium. Various changes of the latter were observed.
>
> "In mild cases this epithelial structure appeared to be reduced to a flat, hyalinized, somewhat keratinized membrane. In some instances, it proliferated. In other cases the united enamel epithelium was destroyed, thereby exposing the enamel to inflammatory œdema and granulation tissue. The former was found to be harmless to the enamel while the latter

13. Bauer, W.—Am.J.Orth. and Oral Surg., Oral Surg. Sect., 32:232-241, 1946.

eroded the enamel and deposited on the surface of the deep excavation a well-calcified, metaplastic cementum-like substance. The effects produced depended on the severity of the inflammation."

In a similar manner, injuries to the deciduous teeth may affect their permanent successors. Hypoplasia may occur, or malformation and eruption or root formation may be delayed.

In conclusion, I feel that one of the main things we need in pedodontia today is more co-operation from a much greater number of parents. And the chief way to obtain this lies in our own hands . . . that is, by the patient and intelligible explanation to every parent who will listen, of the "why and wherefore" of what we are trying to do for their children's teeth.

THE EXAMINATION OF THE PATIENT*

T. SEWARD, B.D.Sc. (MELB.), D.D.S. (N.U.)

Although the practice of dentistry as here described is not always practicable, it is very desirable because the experience and knowledge gained in caring for the more fortunate classes forms the basis of treatment for those less fortunate.

The profession of dentistry includes the understanding of the design and form, structure and purpose of the dentition and the study of the growth and development of the teeth and jaws. The practice of dentistry has for its object the care of the growth and development of the teeth and jaws and the preservation of the design and form of the dental arcades.

The prevention of dental decay is fast becoming a reality; the care of the growth and development of the dentition is a creative approach worthy of the dignity of a profession.

We are born with healthy mouths, mouths that can and should be kept healthy. Is it not strange that usually the permanent teeth are well on the road to destruction before the loss of the temporary dentition? Man, so successful and so conscious of his success in the breeding of animals, remains unconscious of defect in his own children.

Children should be brought to the dentist early; it then becomes the duty of the dentist to send for his little client every three months. During these routine visits every surface of every tooth should be cleaned, polished and treated with some substance that inhibits decay. If decay is present, the affected tooth should be repaired. A repair is a careful cutting away of tooth structure and replacing the lost tissue with some hard material that will restore the form, function and surface condition of the tooth. This part of the work may be regarded as maintaining the form of the individual teeth.

The next procedure is the examination of the various structures that are associated with the design of the dental apparatus. In order to observe the growth and development of the dentition we must know the presence or absence of every tooth, the relation of the dental arcades to each other when at rest and when in action, and their relation to their associated structures.

This information is gained by clinical examination, plaster models and X-ray pictures.

From clinical inspection we observe, in general, the condition of the child and, in particular, the presence and condition of the crowns of the teeth. Examination of plaster models gives more information concerning the cuspal and intermaxillary relations of the dental arcades than can be obtained clinically. Plaster models can be very valuable in the interpretation of X-ray films. X-ray pictures of the hard and soft tissues of the head and neck are taken with the head always in the same position. They may be regarded as the blueprints of the anatomical design giving a general impression of balance or unbalance in the structures associated with the teeth and jaws. These pictures are best when seen stereoscopically.

*Read at the Twelfth Australian Dental Congress, Sydney, August, 1950.

When taken at regular intervals X-rays make a serial record of development that displays the movements of growth and reveals the unfolding of Nature's developmental scheme of the head and neck. Just as an architect recognises a fault in the design of a structure, so the trained dentist will recognise a fault in the developmental plan of the facial skeleton. These serial X-ray pictures constitute the dentist's library, and their study and interpretation the background to his experience.

Regular examinations, not only of the teeth and their immediate structures, but also of the nose, ears and throat are necessary in estimating the developing growth pattern. If, in the change of function (change from suckling to mastication), the muscles concerned with the suspension of the mandible, tongue and hyoid bone become unbalanced, the mandible will not preserve its normal relationship with the skull. This change will affect the dentition. As the mandible drifts backwards, the condyle will encroach on the tympanic part of the mandibular fossa and disturb the structures already in occupation.

If, by clinical observation or X-ray examination, this change is noticed before the teeth have been affected, the mandible may be persuaded to return to its normal position by strengthening the weaker part of the muscular group.

If the condition is made manifest by derangement of the teeth, correction is made by re-arranging the form and function of the dental arcades to as near normal as conditions will permit. This change is accomplished by some form of prosthesis, the choice depending on the operator and the success largely on his technical ability.

If all the teeth have been lost, some correction in the position of the mandible may still be obtained by skilfully constructed artificial dentures—artificial substitutes that restore as nearly as possible the form and assume the functions of the dental arcades.

The great advantage of regular dental examinations is the opportunity to anticipate and guard against abnormal developmental drifts. Normal development is upset by bad habits—habits that are cultivated during our sleeping as well as our waking periods—tooth decay, nasal and pharyngeal disturbances; conditions that should never be allowed to develop.

Teeth of the upper jaw grow and develop in the walls of the nose. If through any chance the normal development of the nose is disturbed, it will be unlikely that the maxillary dental arcade will develop in harmony with the arch of the lower jaw. Development of the nasal walls is disturbed by insufficient use—mouth breathing, blockage in the airways, adenoids, or some pathological condition in the sinuses.

If dentistry for children has for its object the care and guidance of the growth and development of the teeth and jaws, then dentistry for adults should deal with the preservation and maintenance of the form and design of the dental arcades.

The solidity and permanence of a structure depends largely on the condition of its support. If the support of the dental arcades is weakened, the life of the individual teeth is shortened. A break in the continuity of the contact points throws a responsibility on the periodontal membrane and alveolar bone

they are not designed to sustain, causes the teeth to move into positions their fascial support finds intolerable and ends in a breakdown, manifesting itself as pyorrhoea.

When at rest, the position of the mandible is determined by its muscular attachments, but in action its position is determined by the form and position of the functional surfaces of the dental arcades—the line of occlusion. If from any cause the form and position of these functional surfaces change, it must follow that the position of the mandible when in action changes also. These positions vary from that caused by the restrained hinge-like action due to the excessive overlapping of the upper teeth to that caused by the eccentric excursions due to cross bite.

In extreme cases of abnormality the mandible assumes a permanently abnormal position, resulting in unilateral deformity not only manifesting itself in facial distortion but frequently in disturbances of the temporo-mandibular joint and the ear.

Malocclusion is a defect in the anatomical design of the dentition; therefore, in the final analysis, all dental defects are malocclusions. It follows that all dental operations, fillings, crowns, artificial dentures and orthodontic treatment are in reality mechanical expressions of this thesis.

If this concept were appreciated, dentistry would be taught from the developing mouth of the growing child and not from the decaying mouth of the withering adult. The prevention of dental disease would become a reality. Good teeth and healthy mouths would become a characteristic of an otherwise strong and healthy people.

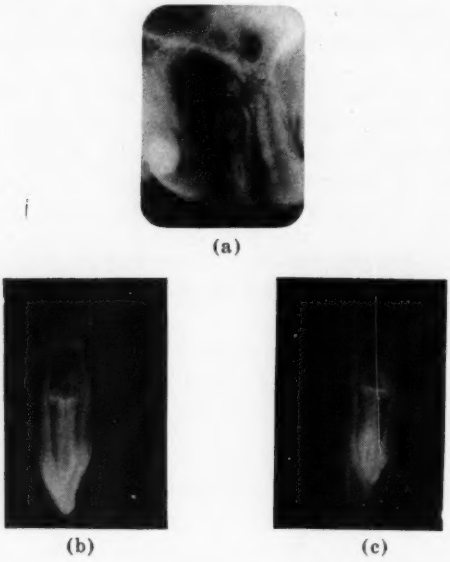
DENS IN DENTE

REPORT OF A CASE AND DISCUSSION.

F. E. HELMORE AND H. R. SULLIVAN.

The occurrence of dens in dente is by no means common and it is believed that only two cases have been reported in Australia[1, 2]. The following report of this somewhat rare pathological condition is therefore submitted.

The patient, B.P., aged twelve, was referred for surgical treatment following upon the disclosure by X-rays of an abnormal upper lateral incisor with an extensive radiolucent area at the apex.



(a)

(b) (c)

Fig. 1.—Radiographic appearance of upper lateral incisor containing dens in dente. 1 (a)—Tooth *in situ* showing radiolucent area in the periapical tissues; 1 (b) and (c)—X-rays showing the extracted tooth in labio-lingual and mesio-distal plane.

Clinical examination.

The labial aspect of the crown of the tooth was normal but the palatal surface was convex and contained a very definite pit and a cusp-like formation. On the labial aspect of the mucous membrane there was evidence of a sinus but there was no free discharge.

Radiographical examination.

The root of the tooth was enlarged and there appeared to be a small tooth within the pulp chamber and the root canal (Fig. 1a). Surrounding the apex

1. Sealey, V. T.—Aust.J.Dent., 54:167, 1950.
2. Boyle, R. L.—Proc. 11th Aust.Dent.Congr., 1948, p. 336.

of the tooth was a large radiolucent area which did not appear to have very defined margins.

Diagnosis.

A dens in dente in an upper lateral incisor accompanied by periapical infection.

Treatment.

The tooth was removed surgically to avoid damage and to allow a thorough investigation of the periapical area. Here, a pale yellowish, rubbery mass of tissue was revealed. It was removed intact by blunt dissection leaving a clearly delineated cavity within the bone. The cavity was dusted with sulphonilamide-sulphathiazole powder, some gelatin sponge inserted as a filler and the muco-periosteal flap sutured back into position with catgut. The recovery was uneventful.

After removal, the tooth was again X-rayed in a labio-lingual plane (Fig. 1b) and a mesio-distal plane (Fig. 1c). This revealed that the inner "tooth" was remarkably uniform in outline.

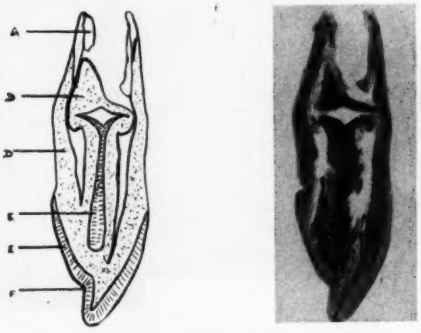


Fig. 2.—Appearance of ground section viewed with transmitted light.
A. Amorphous, calcified tissue; D. Dentine; E. Enamel; F. Foramen leading from lingual surface of tooth into the centre of the invagination.

Pathological report.

1. Examination of the soft tissue removed from the periapical area. The sections showed purulent granulation tissue in which were embedded fragments of flattened squamous epithelium. The diagnosis was given of an infected dental cyst.

2. Examination of the hard tissues of the tooth. The tooth was split longitudinally and one piece was made into a ground section whilst the surface of the other piece was polished for examination by reflected light (Figs. 2 and 3).

The naked eye appearance of the structures confirmed the opinion formed from the radiographic examination. The root of the tooth showed some convexity and was composed of narrow walls. Lying within the enlarged pulpal

chamber was a long, calcified invagination composed of dentine and enamel. The invagination was quite regular, the central portion being composed of enamel and being surrounded by dentine. There was a space in the centre of the enamel "core."

Structurally, the outer layers of enamel and dentine were normal and the direction of the prisms and tubules respectively also was normal. As far as could be determined, the structure of the enamel and dentine within the invaginated portion was similar to that of the remainder of the tooth. There was every indication from the contour and direction of the prisms that not only was the enamel continuous from the external surface to within the invagination but also that an opening existed from the external surface of the tooth into the central core. The apex of the tooth was patent and the walls of the root in this area were quite thin. Lying within the normal dentinal wall at the apex there were some irregular structures which seem to be composed partly of irregular dentine, cementum and amorphous, calcified material. The pulpal tissues were lost in preparation of the section.

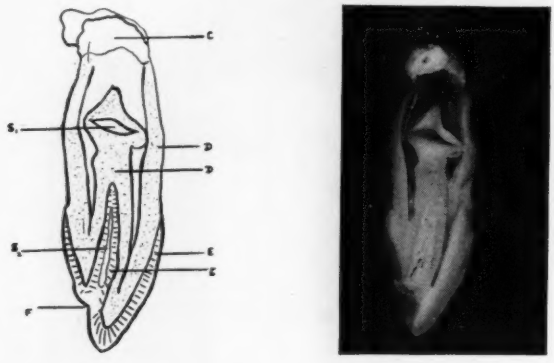


Fig. 3.—Section of tooth viewed by reflected light.
C. Cystic tissue; D. Dentine; E. Enamel; F. Foramen leading into centre of the invaginated tissue; S_1 and S_2. Spaces within the core of the invaginated tissue.

Discussion.

This dental abnormality was originally described in 1856 by Tomes[3]. After that time individual occurrences were described and various attempts made to determine the aetiology. Thoma[4] says "dens in dente are rare" and at the time of publication of his book he had collected references to some twenty-two reports in the literature. A few others have ben reported since, particularly within the last few years. Archer and Silverman[5] reported the occurrence of a double dens in dente in bilateral rudimentary supernumerary central incisors. In both

3. Tomes, J.—Cited by Kitchin, P. C. J.Dent.Res., 15:117, 1935-6.
4. Thoma, K. H.—Oral Pathology, ed. 2, The C. V. Mosby Co., St. Louis, 1944, p. 200.
5. Archer, W. H. and Silverman, L. M.—Oral Surg. Oral Med. Oral Path., 3:722, 1950.

cases the dentes were small, rounded nodules in the crowns of the supernumerary teeth with incomplete roots. Whilst the report is well illustrated, it is not a good example of the dens in dente. Swanson and McCarthy[6] also reported the occurrence of a bilateral dens in dente and single dens in dente have been reported by numerous authors[7-12].

In 1934, Kronfeld[13] described a specimen and, after reviewing the published reports, suggested that dens in dente is the result of invagination of one portion of a tooth into the other. It is not a twin formation but a malformation of only one tooth germ. After the publication of this article, agreement on the aetiology was fairly general and it was summed up by Kitchin[14] thus: "On the basis of the studies and findings of Tomes, Moral, Cohen, Kronfeld, Hoepfel, the author and others, a dens in dente may be generally described as the consequence of an abnormality of that stage of tooth development known as morphogenesis, including the shape of the root area.

Fig. 4.—The external appearance of the lateral incisor.

More specifically it might be defined as the development of a single tooth resulting from abnormal invagination and subsequent degree of enclosure of tooth tissue normally confined to an outside surface."

On another occasion[15] he stated: "The name dens in dente, while convenient,

6. Swanson, W. F. and McCarthy, F. M.—J.Dent.Res., 26:167, 1947.
7. Macdonald, H. M.—Dent.Dig., 24:87, 1918.
8. Kirk, E. C.—Dent.Cosmos, 66:539, 1918.
9. Egan, J. O.—Apollonian, 1:50, 1926. Cited by Index of Dental Literature, Amer.Dent. Ass., Chicago.
10. Adler, P.—Dent.Items Int., 61:418, 1939.
11. Searcy, W. M.—Dent. Radiog. & Photog., 21, 1948.
12. Rabinowitch, B. Z.—Oral Surg. Oral Med. Oral Path., 2:1480, 1949.
13. Kronfeld, R.—J.Dent.Res., 14:49, 1934.
14. Kitchin, P. C.—Oral Surg. Oral Med. Oral Path., 2:1181, 1949.
15. Kitchin, P. C.—J.Dent.Res., 15:117, 1935-6.

is not accurately descriptive. All of several types that have been adequately described and illustrated have proved by the sections of tissues to be invaginations of various areas of the tooth."

Gottlieb[16] in 1948 again stressed the possibility of fusion of two tooth germs but this was again refuted by Kitchin[17] in 1950.

Of the more recent reviews, reference must be made to that of Bohn[18], Gustafson and Sundberg[19] and Pappo[20]. Bohn stated that the literature reported only four cases which had occurred outside the upper anterior teeth. They apparently never occur in deciduous teeth; most frequently they are found in the upper lateral incisor. They are more frequently present in the supernumerary teeth than in normal teeth. He subscribes to the theory of an invagination process and suggests that both the outer and inner enamel epithelium might be drawn down into this process. Gustafson and Sundberg review the matter extensively in addition to reporting upon seven new cases. They remark upon the fact that there is always a communication between the cavity of the invagination and the pulp chamber. They feel that the theory of invagination does not provide any explanation for the origin of this communication nor why an active ingrowth should at times be devoid of enamel (as occurs in a number of their cases). He agrees that the theory of a passive retardation of the invagination is the cause of these conditions but adds as a complement to the theory that absence of ameloblasts may be the primary cause of this malformation.

The case presented here shows far more complete formation than most of those previously reported. It has been investigated both radiographically and histologically. Macroscopic inspection indicates the presence of a tooth within the lateral incisor. Histological examination, however, reveals a very even distribution of enamel and dentine occurring in an invagination, the tissues lying in the inverse position to that normally occupied. It also indicates a communication between the invagination and the pulp chamber (which in this noncarious tooth caused the death of the pulp and the ultimate development of an infected cystic area). All these features help to confirm the theory of invagination put forward by other writers.

ACKNOWLEDGMENTS.

Our thanks are due to Mr. T. Royse-Smith who first recognised this condition and referred it for treatment, and to Mr. E. Slater for his assistance in the reproduction of photographs.

16. Gottlieb, B.—J.Dent.Res., 27:729, 1948.
17. Kitchin, P. C.—Oral Surg. Oral Med. Oral Path., 3:234, 1950.
18. Bohn, A.—Acta Odont.Scand., 8:53, 1948.
19. Gustafson, G. and Sundberg, S.—Brit.Dent.J., 88:83, 112, 1950.
20. Pappo, H. E.—Dens in dente, Paris, 1949. Review in Rev.Stomat., 51:105, 1950.

COSTEN'S SYNDROME

E. A. ADLER.*

In 1934 Dr. J. B. Costen[1] published an article describing a symptom complex, which later became known as Costen's syndrome. The aetiology of the syndrome was stated as being simple mandibular overclosure alone, or together with irregular movement of the condyles in the glenoid fossae. This paper consists of a review of the anatomical factors on which the syndrome is based and discusses the advisability and method of treatment.

Before listing the symptoms which constitute the syndrome, it is interesting to consider the difficulties which Costen[2] admits he encountered during his investigations.

1. Cases showed only some symptoms. Costen did not elucidate further on this point and there is a possibility that cases were incorrectly diagnosed due to incomplete evidence.

2. Certain sinus, opthalmic, and constitutional defects gave exactly the same symptoms as the joint defects. Walsh[3] accepts this and even goes to the extent of deploring the fact that in New Zealand some patients with obvious ear, nose and throat defects—sufficient to produce characteristic symptoms—are being treated for those defects instead of being referred to a dental hospital as possible cases of Costen's syndrome.

3. Neurotic or patients with a low grade of intelligence described misleading reactions.

4. Finally, in the treatment, simple opening, trial dentures, and radiographs gave different findings.

Bearing in mind that the essence of all scientific work is adequate control, it is questionable whether there is justification in accepting Costen's conclusions, based as they are on such variables. The symptoms of the syndrome as suggested by Costen are as follows:—

(a) Intermittent or continuously impaired hearing.
(b) Stopping or stuffing sensation in ears (especially at meal times).
(c) Tinnitus of the subjective variety.
(d) Dull or drawing pain within ears.
(e) Headache about the vertex and occiput and behind the ears.
(f) Burning sensation in the throat, tongue and side of the nose.
(g) Dryness of the mouth with almost complete absence of saliva.
(h) Snapping noise when chewing.

Before discussing the symptoms I wish to refer back to one of the first sentences in this paper regarding the aetiology. "The syndrome was due to simple mandibular overclosure alone, or together with irregular movement of the condyles in the glenoid fossae." It is important to have a clear idea of

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1. Costen, J. B.—Annals of Otology, Rhinology and Laryngology, XLIII:1, 1934.
2. Costen, J. B.—J.A.D.A., 24:1507, 1937.
3. Walsh, J. B.—N.Z.D.J., 44:240, 1948.

what is meant by overclosure and irregular movement. First, what is the normal in either case? Thompson[4] identifies two positions of normal closure: the resting vertical dimension, which is considered to be constant from the age of three months onwards; and the occlusal vertical dimension, which is not constant and is usually 3-4 mms. less than the resting vertical dimension.

As a basis for definition the mandible is overclosed when it has to move open through more than 4 mms. to return to the physiological resting vertical dimension.

Harvey[5] bases his definition on the degree of overbite of the central incisors, but makes no provision for the edentulous case.

Normal movement is somewhat harder to define. However, in this case histology provides a basis for reference.

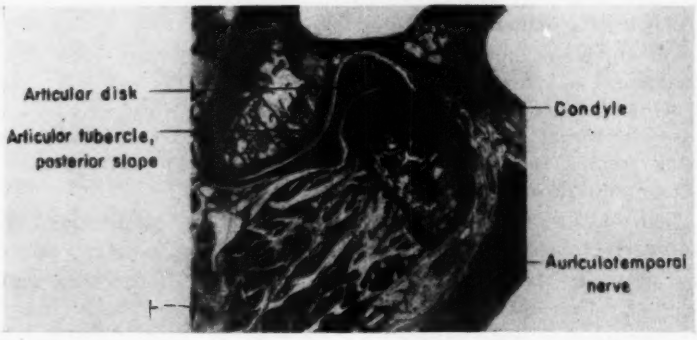

Fig. 1.—Longitudinal section through the condyle of the mandible and associated tissues. From an article by H. Sicher in the *Journal of the American Dental Association.*

If a sagittal section through the temporo-mandibular joint is studied it will be seen that only the crest and the posterior slope of the articular eminence are covered by fibro-cartilage whereas the remainder of the glenoid fossa is lined by simple periosteum (Fig. 1). It is well recognized that when one set of muscles contract, the antagonists, although slightly inhibited at the synapse, also contract to maintain a balance. That is, when the masseter, medial pterygoid, and temporal muscles contract to close or overclose the mandible, the lateral pterygoid also contracts. The nett effect is that the condylar head is kept hard against the posterior slope of the eminentia, but separated from it by the meniscus. Normal movement takes place when the condylar head moves evenly against the opposing fibro-cartilage, and irregular movement takes place when it moves outside the range of the cartilage or unevenly within the range.

4. Thompson. J. R.—J.A.D.A., 33:151, 1946.
5. Harvey, W.—B.D.J., LXXXV:219-225, 249-255, 1948.

It is important to have basic definitions, for throughout a lot of the literature on Costen's syndrome there has been either a tendency to accept blindly the authority of a previous author or else to base far-reaching conclusions on observations made during a routine dissection of a cadaver; yet there are many problems that present themselves in the living body which are not discernible in the cadaver. With these fundamentals in mind I have divided the list of symptoms into four groups—ear, sinus, tongue, and joint—and will discuss the anatomy of the regions in which the symptoms are manifest, keeping in mind overclosure and malposition.

Ear symptoms: The interruption to hearing is explained by Costen as follows: "Overclosure (this is in the cadaver) led to all soft tissues next to the eustachian tube, including the tensor palatini, becoming wrinkled, and the tube was closed firmly." Sicher, in the process of clarifying the above statement, points out that the medial pterygoid, in the region that is likely to have an influence on the eustachian tube, is indeed tendinuous. This means that, however much the mandible is overclosed, there will not be any change in the diameter of the muscle, in the portion that has a relation to the tensor palatini. Further, there will be a tendency for the tensor palatini to contract at the same time, to elevate the soft palate to allow for the accommodation of the tongue. Ventilation of the eustachian tube is automatic with contraction of the tensor palatini so, contrary to blocking the tube, overclosure would appear to open it.

Costen acknowledges the fact that the palate will rise during overclosure but maintains that it is displaced by the tongue, so much as to block the pharyngeal opening of the eustachian tube.

In Fig. 2 can be seen the relationship of the orifice to the palate. Remember first that the tube is entering at an oblique angle so the orifice is large and secondly that the posterior tubal elevation, which further down becomes the salpingo-pharyngeal fold, is designed especially to maintain the patency of the tube. It would require an exceptionally mobile soft palate to assume a position against the lateral wall of the nasopharynx that would effectively block the tube.

In addition to this line of argument, I would like to refer to a particular portion of Harvey's[5] work on otitic-baratrauma. Briefly, Harvey investigated the relationship between malocclusion and/or overclosure to deafness in pilots.

As an extreme control, he removed the dentures of ten edentulous pilots and, instructing them to maintain their ridges in apposition (which is an extreme of overclosure) subjected them in a decompression chamber to violent changes in altitude. Only one was unable to ventilate his tube by swallowing and he reported having a cold. It would be extremely difficult to maintain the jaws in that position for any length of time but, although Harvey does not mention the problem, I am sure that he took the necessary steps to maintain the conditions of the control.

I have stressed the reference to interrupted hearing, for in most case histories it is the dramatic improvement in hearing on restoring the correct

occlusal vertical dimension that is given as proof of the existence of Costen's syndrome. Under the circumstances I do not think we should omit to keep in mind the possibilities of psychoses or even simple catarrhal deafness, the courses of which are quite liable to end relatively spontaneously.

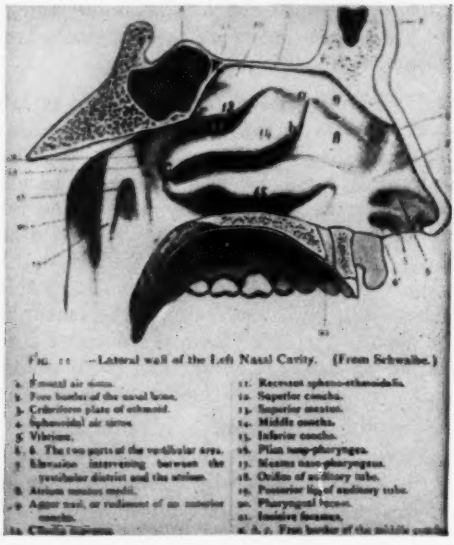

Fig. 2.—The lateral wall of the left nasal cavity (Cunningham).
By courtesy of Hodder and Stoughton Ltd.

The other ear symptoms—stopping sensation, dull pain within ears, and tinnitus—are offered without explanation by Costen.

In relation to tinnitus, Conner[6] says: "It is a very common symptom found in many conditions"—one of which is the biochemical action of degenerative products on the auditory nerve. It is of interest that many of the reported cases of Costen's syndrome occur in females about the menopause when the ovaries are undergoing degenerative changes.

Jackson and Jackson[7] point out the occurrence of psychogenic pathways of pain from the tongue to the mandibular joint as a result of tinnitus.

Sinus symptoms: This group, which includes headache and pain in the vertex and occiput, is so called because the symptoms simulate the pain due to an infection of the posterior sinuses, such as the mastoid. Keeping in mind the difficulty for the condyle head to occupy a position other than against the

6. Conner, C. E.—Fundamentals of Otolaryngology, Philadelphia, W. B. Saunders Co., 1949, p. 90.
7. Jackson & Jackson.—Diseases of Ear, Nose and Throat, Philadelphia, W. B. Saunders Co., 1946.

posterior wall of the eminentia, I will quote Costen's explanation of the pain. "Irritation of auriculo-temporal by movement of condyle mesially or backward as nerve passes close to mesial side of capsule between condyle and tympanic plate, to distribution over the vertex and temporal region." I use that sentence verbatim because it appears time and time again as an authorative explanation of sinus pain. However, Sicher[8] was not satisfied and decided to do a special dissection from the posterior to gain a proper perspective. He found that the nerve in its lateral passage passes inferior to the condylar attachment of the capsular ligament (Fig. 3). It is therefore evident that unless the condyle moved down and back through a considerable distance, certainly beyond

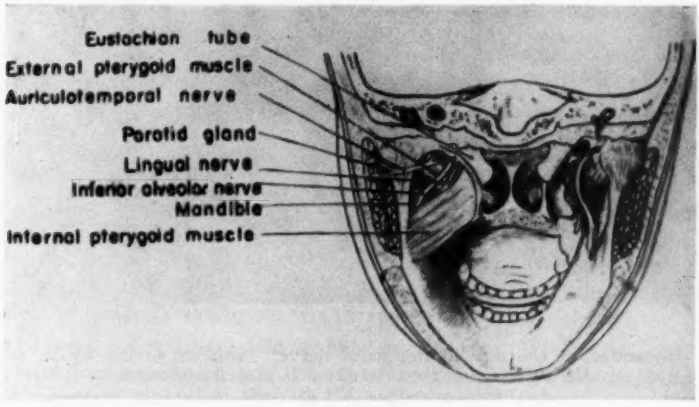

Fig. 3.—Posterior dissection showing the relationship of the auriculo-temporal nerve to the condylar attachment. From an article by H. Sicher in the *Journal of the American Dental Association.*

the normal excursion of the capsular ligaments, it would be unable to cause the impingement of the auriculo-temporal nerve which Costen maintains is the origin of the referred pain in the vertex and occipital region (Fig. 4).

One further consideration comes to light here. The auriculo-temporal nerve sends a few fibres to supply the capsular ligament. It is reasonable to postulate that a rotary motion of the condyle in the fossa—as would occur in overclosure—could cause a stretching of the posterior fibres of the ligament and the pain could, within the principles of physiology, be referred over the distribution of the auriculo-temporal nerve. Significantly the auriculo-temporal nerve sends some twigs to the otic ganglion and the ganglion has either direct or indirect connections with the tympanic plate, eustachian tube, pharynx, tongue and parotid gland. Unfortunately, I feel that this is using an anatomy text-book for a purpose for which it is not designed and would

8. Sicher, H.—J.A.D.A., 36:133, 1948.

not be accepted as scientific reasoning. That Costen is also guilty, in part, of the incorrect use of the text-book we shall see directly.

Tongue symptoms: Costen considers that the pressure of the condyle on the chorda tympani nerve as it passes medially and forward in the petro-tympanic fissure is the anatomical explanation of pain in the tongue. The chorda tympani eventually joins the lingual nerve. Apart from the fact that the chorda tympani is merely a filament in the fossa region, and is protected from the joint cavity by fibrous tissue, and in some skulls by bone, it is perhaps important to remember that in this region it carries only taste fibres for the anterior two-thirds of the tongue.

Fig. 4.—Dissection of the auriculo-temporal nerve. From an article by H. Sicher in the *Journal of the American Dental Association.*

Jackson and Jackson's[7] only references to glossodynia (burning sensation in the tongue) are in relation to pernicious anaemia and secondarily to psychosis. The latter is of possible significance and I will discuss it later.

Joint symptoms: Clicking in the joint. In the literature there is very little about this. Costen maintains that excessive movement of the head of the condyle over the relatively fixed meniscus causes wear and eventual perforation. During the perforation Costen considers that clicking would be evident, especially at meal times.

Schuyler[9] offers an explanation whereby he considers that premature contact in the molar region acts as a fulcrum for a lever, the ends of which correspond to the incisor teeth and the condylar head. The action of this Class I lever he considers causes the noise.

Before leaving this point it is important that we draw distinction between chronic subluxation, in which clicking will result quite frequently at the extreme of opening due to spontaneous dislocation and reduction of the condyle, and the snapping which occurs at the end of closing which Costen includes as a symptom in his syndrome.

9. Schuyler, C. H.—J.A.D.A., 26:734, 1939.

Costen has described a syndrome: by definition this is diagnostic of disease, but the question arises, what disease? What are the types of joint discrasias that have been identified?

Markowitz[10] has given the clearest picture. I would like to list the conditions because his article deals with each in turn.

1. Traumatic. (a) Fracture
   (b) Dislocation
   (c) Contusion
   (d) Strain
   (e) Malocclusive.
2. Infections. (a) Suppurative
   (b) Non-suppurative.
3. Congenital.
4. Extra-articular, e.g., referred from impacted tooth.
5. Psychogenic.
6. Arthritis, rheumatoid and osteo.

In that list, the only diseases with symptoms remotely similar to the syndrome are osteo-arthritis, malocclusive traumatic disease and psychogenic disease. A deforming osteo-arthritis of the joint is rare, but it does give rise to some pain and snapping in the joint.

However, from our knowledge of arthroses, it is extremely unlikely that an osteo-arthritis is reversible, especially as dramatically as the case histories in relation to Costen's syndrome would suggest.

That leaves malocclusive and psychogenic disease. Markowitz, in a review of 700 patients chosen at random from the Naval Hospital, Philadelphia (which includes veterans' administration and family hospital components; so it is a good cross section of healthy, chronic and acutely sick patients), finds that malocclusive temporo-mandibular disease occurred in twenty-six individuals to a degree which was sufficient to cause pain and clicking. Markowitz subdivides these twenty-six according to the state of dentition and history of trauma. In general he found a history of trauma to be regular, but the state of the bite was irregular, implying that overclosure is not as important as a history of trauma. It is interesting to find that Markowitz considers trauma to be present if "bizarre movements are carried out by malocclusive individuals in occluding their teeth."

The last disease is psychogenic. This is certainly not the least. Walsh[11] has most of his cases referred from either psychiatric or neuro-surgical departments, and he considers that a tremendous number of people must have undiagnosed Costen's syndrome.

The subject now resolves itself on the advisability of treatment. This depends to some extent on from where the patients come. If they are referred from an ear, nose and throat specialist it is assumed that there are no lesions liable to produce the symptoms. Hence the condition is either to be treated as correction for malocclusion, or referred to a psychiatrist.

10. Markowitz, H. A.—Oral Surgery, Oral Med. & Oral Path., 2:1309, 1949.
11. Walsh, J. P.—N.Z.D.J., 45:233, 1949.

If the patient is referred from a psychiatric department, any treatment that a dentist may undertake can at best mean that the symptoms will disappear from one point, only to reappear in some other guise at another point. However, this might be considered as successful temporary treatment.

Whatever the symptoms or aetiology may be, a dentist may be called upon to adjust a malocclusion or correct an overclosed vertical dimension. This should be undertaken after an examination of the local merits of the case. Whether remission of the symptoms of the syndrome will take place or not is a question which with our present state of knowledge we are incapable of answering. It should be remembered, however, that we are working, not on an articulator in the laboratory, but in the mouth, a complex human mechanism. Great care and much foresight must be exercised to ensure that the result will be an aid in the restoration of uncomplicated function.

Conclusions:

1. The anatomical explanations so far offered do not satisfactorily explain the symptoms.

2. Before treatment it is advisable to decide if the lesion is physical or psychogenic.

3. The problem is one where closer co-operation between the medical and dental profession is called for.

4. At our present stage of knowledge we may say that it is doubtful whether overclosure alone or together with condylar malposition gives rise to the symptoms known as Costen's syndrome.

DENTAL MATERIALS

Current Notes (No. 6)*

Discolouration of acrylic restorations: From time to time comments have been received on the staining or discolouration of acrylic teeth and inlays, and this appears to be attributable to the pigment. Acrylic resin is slowly permeable to water and no doubt other small molecules such as hydrogen sulphide. If heavy metal impurities are present, brown or grey discolouration could result through the formation of sulphides.

A serious form of discolouration recently brought to notice concerns the self-curing resins, whether used for restorations or for cementing crowns. The colour change is towards yellow or orange which, to the dismay of dentist and patient, is sometimes quite obvious. The cause of this is not yet certain but it is almost sure to be associated with the use of the activator which distinguishes self-curing resin from the conventional acrylic resins.

Apparently there are activators which are resistant to discolouration, for Taylor and Frank[1] recently concluded: "It seems reasonably safe to state that it is possible to make self-curing resins with perfectly satisfactory colour stability." (This article, incidentally, the most fundamental so far available on these dental materials, was referred to in Current Notes No. 3. At that time, however, only a typescript copy was available but it can now be read in the Journal of Dental Research.)

It would be of considerable help if any practitioners who find it necessary to remove discoloured restorations would send any recovered material to the Commonwealth Bureau of Dental Standards with comments such as when they were inserted and any relevant details about the patient—whether a smoker, whether caries susceptible, etc.

Two further articles on the self-curing resins by Rheuben[2] and McLean[3] have recently been published and will be of interest to dentists experimenting with these materials.

"Airbrasive" technique: Considerable interest was shown in a film on this subject shown at the Dental Congress in Sydney last August. Black[4] has recently published an article on the use of the technique. The impact of abrasive particles is more destructive to hard, brittle surfaces than to tough resilient materials so that, although enamel is readily cut by the abrasive stream, soft carious dentine cannot be removed.

It is interesting to note that diamond instruments are stated to reach their highest efficiency also when used against the hardest tissues[5].

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*Contribution from the Commonwealth Bureau of Dental Standards.

1. Taylor, P. B. and Frank, Sybil L.—J.D.Res., 29:486-92, 1950.
2. Rheuben, P. R.—D.J.A., 22:555-66, 1950.
3. McLean, J. W.—B.D.J., 89:215-26, 1950.
4. Black, R. B.—J.A.D.A., 41:701-10, 1950.
5. Hislop, T. and Hislop, R. B.—Oral Topics, 67:268-9, 1950.

The ADA N.S.W. DENTAL JOURNAL of AUSTRALIA

EDITORIAL DEPARTMENT

DENTAL TECHNICIANS' ASSOCIATION OF NEW SOUTH WALES

In order that the members of the New South Wales Branch of the Australian Dental Association might be fully cognisant of some of the actions that have been taken by their Executive over the past years in relation to dental technicians, it is intended on this occasion to omit the usual type of editorial and to substitute a review of recent industrial action concerning the use of the term "dental prosthetist" and its implications.

A careful study of this review and judgment would indicate that your Executive has been active in this matter for some considerable time. This activity has now culminated in the awarding of the judgment, printed below, by Mr. Justice Webb of the Industrial Commission of New South Wales.

REVIEW.

From 1941 to 1947 the employees' union for the purposes of the Dental Mechanics State Award was termed "The Dental Mechanics' Association of New South Wales." Towards the end of 1946 and in 1947 certain changes in name, constitution and rules of that Association were made, as outlined in the subtended judgment. In particular, the name "Dental Prosthetists' Association of New South Wales" was substituted for its former name.

This was unbeknown to the Australian Dental Association, New South Wales Branch, at the time but, having become aware during 1947 of these matters, your Association explored several avenues to correct what it regarded as an unjustifiable claim. Eventually, after considerable investigation, industrial action was decided upon and in August, 1950, the application referred to in the judgment was made by your Association.

The first hearing took place on 11th September, 1950, as a matter of urgency, to take evidence from Dr. W. H. Terrell during his visit to Congress. A further hearing, which was to be held on 10th October, was deferred, upon application by the Dental Prosthetists' Association pending a conference with your Association to attempt to settle the matter.

A conference was held and the representatives of your Association made it clear to the employees' Association that your Association objected strongly to the use of the name "Dental Prosthetists" by the employees' Association. On the basis that the name would be changed, the employees' representatives

requested the co-operation of your Association in the establishment of status for dental mechanics and its co-operation in the setting up of a registering authority for dental mechanics.

As to the latter, the Australian Dental Association, New South Wales Branch, then sought legal advice and was informed that under its constitution it could not become a party to any scheme of accreditation of dental mechanics. That advice was duly communicated to the employees' Association and it was stated that, nevertheless, your Association was anxious to help in any other possible way for the improvement of the status of dental mechanics and the relationship between them and the dental profession.

In reply to this letter a letter was received from the Secretary of the Dental Prosthetists' Association baldly stating that it was the decision of a general meeting of the Dental Prosthetists' Association that they would defend the application then before the Industrial Commission.

Further hearings of the application took place on 13th, 14th and 15th March, when evidence was taken from Professor Arnott, Dr. C. Graham and Mr. C. C. Croker. On 22nd March, Mr. Justice Webb delivered the 12-page judgment printed below.

THE INDUSTRIAL COMMISSION OF NEW SOUTH WALES.

CORAM: WEBB J.

DENTAL PROSTHETISTS ASSOCIATION OF NEW SOUTH WALES.

Application by Australian Dental Association (New South Wales Branch) for cancellation of registration as industrial union of employees (No. 269 of 1950).

Thursday, 22nd March, 1951.

JUDGMENT.

HIS HONOUR: This application by the Australian Dental Association, New South Wales Branch, industrial union of employers, for the cancellation of the registration of the Dental Prosthetists Association of New South Wales as an industrial union of employees, is based upon the following grounds set out in the Notice of Motion:—

(1)—THAT the registration of the Dental Prosthetists Association of New South Wales as an Industrial Union of Employees under that style ascribes to the members of that Association a professional qualification, status and function not possessed by them or any of them.

(2)—THAT the registration of the Dental Prosthetists Association of New South Wales as an Industrial Union of Employees under that style is misleading and confusing to persons having dealings with prosthetists and being entitled to be guided by the use of the name of prosthetist.

(3)—THAT the registration of the Dental Prosthetists Association of New South Wales as an Industrial Union of Employees under that style is embarrassing to prosthetists truly so called.

(4)—THAT the registration of the Dental Prosthetists Association of New South Wales as an Industrial Union of Employees under that style is mischievous and contrary to public interest.

The respondent Association was originally registered under the style of the Dental Mechanics Association of New South Wales as a trade union under the Trade Union Act, and subsequently on 7th November, 1941, as an industrial union of employees under the Industrial Arbitration Act. By its Constitution Rule, it was to consist of "all persons of good character who are admitted as members of the Association and who are employed or competent to be employed as dental mechanics."

On 6th November, 1946, the change of name of the Dental Mechanics Association to the Dental Prosthetists Association of New South Wales was registered under the Trade Union Act. On the same day, the approval of the Registrar having been previously obtained on 19th September, 1946, a complete amendment of the rules including an amendment of the Constitution and Objects Rules of the Association under the Trade Union Act was registered. The change of name was subsequently recorded on the 13th February, 1947, in the register of industrial unions (Industrial Arbitration Act, Section 8 (6)).

The constitution of the organisation as registered on 6th November, 1946, was in these words:—

> **2. Constitution.**
> The Association shall consist of all persons of good character who are admitted as members of the Association and who not being persons registered as dentists under the Dentists Act, 1934, are employed as dental prosthetists or as dental apprentices.
> Amongst the objects added to the Objects Rules were—
> (e) to secure the establishment of Boards to regulate the registration of dental prosthetists.
> (f) to conduct regular correspondence with kindred Associations in all parts of the world relative to dental prosthesis.

In considering the application to record the change of name of the Association in the register of Industrial unions from one of dental mechanics to an association of dental prosthetists, the Registrar did not, as he might have done pursuant to Section 8 (6), require the Association to follow the procedure prescribed in respect of applications for the registration of industrial unions which would have involved the giving of a general notice by public advertisement of the application. Nor when considering the application to amend its constitution rule, did the Registrar require any notice of the proposed alteration to be published or served (see In re United Labourers Protective Society 1933 A.R. 199). It is to be presumed, therefore, that, in approving the alterations of its constitution, and in recording the change of name, the Registrar concluded that the Association did not intend to alter its scope and that he formed the opinion that the term dental prosthetist covered the same industry or calling as that of dental mechanics.

In any event no opportunity was afforded to any interested party to lodge an objection to the registration of the industrial union as one of dental prosthetists, or to make any submissions as to the propriety or otherwise of the adoption by a union of dental mechanics, as properly applicable to them, of the description of dental prosthetists.

The applicant Dental Association now contends that the terms are in no way synonymous; that a dental prosthetist is, in this State, a registered dentist practising or specialising in that department of his profession which is known as prosthetic dentistry while a dental mechanic is one who is concerned with the mechanical construction or renewal or repair of artificial dentures upon the order of a registered dentist. In support of its contentions, oral evidence was called by the applicant Association, and a number of dictionaries and textbooks were tendered to the Commission and referred to by Mr. McKeon of Counsel for the applicant.

The word "prosthetist" according to the Supplement to the Oxford English Dictionary means "One who practises prosthesis of limbs, teeth, &c." As an

illustration of the use of the word in 1911, it quotes from G. H. Wilson Man. Dental Prosthetic 455: "It is necessary that the patient shall be under the inspection and study of the prosthetist so as to restore the contour and harmonize the associated parts." The word "prosthetist" derives from "prosthesis" which the same Dictionary defines in surgery as "That part of surgery which consists in supplying deficiencies, as by artificial limbs or teeth, or by other means" and cites "1902 Encycl. Brit. XXVII 417/2 Dental Prosthesis." "Prosthetic" is its adjectival form and means "Pertaining to, or of the nature of prosthesis" and the Dictionary as an illustration gives: "1902 Brit. Med. Jrnl, 19 July, 180/1, The history of operative and prosthetic dentistry."

Other relevant dictionary meanings put in evidence were "prosthetist" a specialist in prosthesis; "prosthodontist" a specialist in prosthetic dentistry, Dunning & Davenport Dictionary of Dental Science and Art 1936; "prosthetist" (1) one who makes artificial limbs, (2) in dentistry one who specialises in the construction of artificial dentures, Stedman's Medical Dictionary, 15th Revised Edition. In Webster's New International Dictionary of the English Language, Second Edition 1944 "prosthetics" is defined as the branch of surgery or dentistry that treats of prosthesis and gives "prosthetist" as the noun derived therefrom; this work also defines prosthodontia alternatively as prosthetic dentistry and dental prosthesis, with prosthodontist as the noun.

Passages from authoritative text books tendered by Mr. McKeon included:—

Anthony's American Textbook of Prosthetic Dentistry, Seventh Edition, in which in an article at page 13 Dr. Turner, D.D.S., M.D., ScD. says:— "Dental prosthesis is that division of the art and science of dentistry which is concerned with the replacement of missing human teeth by artificial substitutes."

The Principles and Technics of Full Denture Construction by Dr. Frahm, A.B., D.D.S., where at page xiv of the foreword the author says:—

> "The word 'prosthesis' is compounded from the Greek 'Pros,' to, and 'tithemi,' place. In surgery it is used to denote the replacement of any lost or missing part of the body by an artificial substitute. The term 'prosthetic dentistry,' or 'prosthodontia,' may therefore be defined as an account of methods for the replacement of any lost or missing parts of the dental organism by artificial substitutes. Oral prosthesis is a more comprehensive term, and includes other parts besides the teeth and gums; e.g., the artificial vela and obturators used in the mechanical treatment of cleft palate."

Complete Denture Prosthesis by R. O. Schlosser, D.D.S., F.A.C.D., Second Edition, in which at page 1 "prosthetic dentistry" is defined as "that branch of dental science which treats of the various methods of providing suitable substitutes for the lost organs of the mouth in whole or in part, the artistic and mechanical processes involved in such restoration, together with a description of the physical properties and peculiarities of the various materials employed" and "Complete denture prosthesis" as "that branch of prosthetic dentistry which has to do with those restorations and procedures employed when dealing with patients who have lost all natural teeth or are soon to lose them." At page 2 the learned author states:—

> "It is the province of the prosthetist to correct, as far as possible, the ravages occasioned by disease and time, and restore to the patient his normal appearance.
>
> "To do this the prosthetist should be a master of his art; one who can, at

> will, imitate Nature in her ideal as well as less typical forms and moods. From the nature of his vocation he should be an anatomist, a sculptor, an artist, an engineer and an artisan, and be thorough and proficient in each field mentioned. In this way only can he fulfil in the highest degree, the requirements imposed upon him by his profession."

A lengthy quotation was also made by Counsel from an article by Clyde H. Schuyler, D.D.S., appearing at page 66 of the Journal of the American Dental Association, Volume 41, Number 1, July, 1950, from which I record the following passage:—

> "The work of the dental prosthetist requires a knowledge of histology, anatomy, physiology and other basic sciences. The artificial denture must function as part of a living organism. The denture made with a disregard of these factors, or one used after tissue changes contraindicate its continued use, may not only fail in restoring function and esthetics, but may cause oral irritation, rapid resorption or destruction of supporting tissues and malignant degeneration."

As illustrating the difference between the dental mechanic and the dentist in relation to the patient, Mr. McKeon quoted from the Dental Laboratory Review, Volume 23, Number 1, January, 1948, in an article by Counc. McNair at page 30, in which he says:—

> "After taking an accurate impression the dentist should take full responsibility for the fit or misfit of the appliance. His thoroughness should be backed up by a frank willingness to pay for his own mistakes. The greater responsibility rests with the dentist as far as the fit of an appliance is concerned.
>
> "Our procedures in the laboratory are mechanical and exact for we, unlike the dentist, do not work with variables (such as movable tissue and gagging patients)."

I turn aside from the question of the meaning assigned by the authorities quoted to the words "prosthetists," "dental prosthetists" and "prosthodontist," and the scope of their work to set down the statutory provision made by the Legislature with respect to the practice of dentistry in New South Wales.

The practice of dentistry in this State is regulated by and under the Dentists Act 1934-1936 and for the purpose of the Act the practice of dentistry includes under Section 3 (2):—

> (c) the mechanical construction or the renewal or repair of artificial dentures or restorative dental appliances; and
>
> (b) the performance of any operation on, or the giving of any treatment, advice or attendance to any person, as preparatory to, or for the purpose of or for or in connection with the fitting, insertion, fixing, constructing, repairing or renewing of artificial dentures or restorative dental appliances.

By section 12 (1) no person, other than a dentist registered under this Act, shall practise in dentistry, or do or perform any act, matter or thing, the doing or performance of which forms part of the practice of dentistry; but by subsection (3) thereof nothing in the section shall operate to prevent (d) the mechanical construction or the renewal or repair of artificial dentures or restorative dental appliances by any person upon the order of a registered dentist.

The qualifications to entitle a person to be registered as a dentist are set out in section 10. It is not necessary to quote them in detail. It is sufficient to say that they are of a high order and, as marking the required standard, they include the qualification of a graduate in dentistry of any University in Australia or of a dental college affiliated with a University in Australia. With respect to our own University of Sydney, it may be noticed in passing that one

of the courses of instruction to be attended in each year and in which candidates for the degree of Bachelor of Dental Surgery are required to pass an examination at the end of each year is that of prosthetic dentistry.

By section 6 (1) (e) the Registrar under the Act is required to enter in a register certain prescribed particulars including (e) particulars of any certificate, diploma, membership, degree, license, letters, testimonial, or other title, status, document or *description* which the registered dentist is authorised by the Board to use in relation to himself as a dentist or the practice of dentistry by him.

By section 10 (6) "A registered dentist shall not use any certificate diploma, membership, degree, license, letters testimonial or other title, status, document or description in relation to himself as a dentist or the practice of dentistry by him other than those (if any) which the Board has authorised in pursuance of paragraph (e) of subsection one of section six of this Act to be entered in connection with his name in the register."

Referring to the matter of "additional description" that may be authorised by the Dental Board to be used by a person in relation to himself as a dentist or the practice of dentistry by him, Dr. Arnott, Dean of the Faculty of Dentistry within the University of Sydney, said, in the course of his evidence, that the policy of the Dental Board was that, if a member of the dental profession applied for the use of an additional description, the Board required that the applicant give an undertaking to limit his practice to that particular branch of dental science. Of his own knowledge, Dr. Arnott said that only one dentist had been registered with the additional description of "prosthodontist" a word synonymous with "dental prosthetist" and which the particular dentist concerned had preferred to "dental prosthetist."

In further support of its contention that the term "dental prosthetist" is not a proper description of the persons of the class of which the respondent union is really constituted, oral evidence was also called by the applicant Association. Dr. Arnott described prosthetic dentistry as the science which deals with the restoration of lost dental structures, including the complete practice of the science from the examination of the patient (e.g., clinical and radiographic examinations), the taking of impressions, the taking of the bite, the construction of the dentures on the mechanical side, and then finally the fitting of the dentures in the patient's oral cavity. There is also involved, he said, in prosthetic dentistry, which is the art and science of dental prosthesis, the matters of cleft palate, the loss of palate of a patient, the hard and soft structures and, in the case of facio-maxillary surgery, the construction of prosthetic appliances to aid and assist the plastic surgeon in his construction work. In speaking of construction, Dr. Arnott said that that included the examination of the parts, the taking of the impression and so on—whatever was involved in the procedure. A "prosthetist," Dr. Arnott said, was a registered dentist who supervised or practised prosthetic dentistry and he limited the description to those who specialised in this branch of dentistry. In addition to the one dentist registered with the additional description of "prosthodontist", Dr. Arnott estimated there were from twelve to twenty dentists in the State who specialised as prosthetists, i.e., who specialised in prosthetic dentistry. A dental mechanic,

said Dr. Arnott, was not a prosthetist; he was purely a mechanic who carried out under the instruction of a dentist certain laboratory procedures in the construction of dentures.

Dr. Graham, who is Senior Lecturer in the Department of Prosthetic Dentistry, and also Director of and formerly Lecturer in the Dental Technicians Course, at the United Dental Hospital and who also, apart from lecturing, exercises his profession with respect to patients referred from general practitioners for special treatment in dental prosthesis, said he termed himself a prosthetist, being a specialist in prosthetic dentistry. He restricted his work to prosthetic dentistry although he was not registered under the Act as entitled to use the additional description. Dr. Graham said that the fundamental difference between the Dental Mechanics course at the Hospital and the University course was that in the technicians' course laboratory procedures were only dealt with and the patient was never discussed. Students were taught to observe and understand directions with regard to models. They knew nothing about mouth examination and the course did not touch the basic sciences of biology and anatomy to any great extent. It was sufficient for the mechanics to understand the terminology. The course had not differed over the years and the work of mechanics compared with 1941 was practically identical except for any new materials that might have since been introduced. Dr. Graham considered a "prosthetist" is any registered dentist who practised prosthetic dentistry, whether a specialist or not. He thus gave a wider scope to the word than did Dr. Arnott.

Mr. Croker, B.D.S., University of Sydney, Superintendent of the United Dental Hospital, expressed the view that the dentists practising prosthetic dentistry in the prosthetic department at the Dental Hospital were prosthetists during their stay in the department. In actual practice they carried out the surgery procedures. In Mr. Croker's opinion the work of prosthetists could be divided into surgery procedures and laboratory procedures. The registered dentist was capable of carrying out all the surgery procedures and all the laboratory procedures. The dental technician, both by training and by law, was not capable of carrying out any procedures in the surgery but could carry out most of the procedures in the laboratory. There were, however, some laboratory procedures, for example, in immediate denture preparations, which only a dentist could perform. Mr. Croker agreed with Dr. Graham's view that a prosthetist was one who practised prosthetic dentistry. To his mind he said "prosthetist" fell into three categories: (1) the dentist who practised prosthetic dentistry, (2) the dentist who by his increased knowledge and skill is looked upon as a specialist prosthetist, and (3) the dentist who is entitled to the added description under the Dentists Act.

Evidence was also given by Dr. W. H. Terrell, who for the last twelve years has been Professor in Prosthetics of the University of Southern California, and who is a certified specialist under the American Board of Prosthodontia established to determine the qualifications of dentists who wish to practise the speciality of prosthodontics. He said that at the present time in America no dentist can set himself up as a specialist in prosthodontics or prosthesis unless he had passed examinations prescribed by the Board. He also had to submit

to the Board a complete history of his contributions to prosthetic dentistry during a term of practice of dentistry and, after that had been done, the Board examined his past qualifications on dentures as to whether he shall be allowed to practice the speciality of prosthodontics. In America the term "prosthetist" was not applied to any practitioner in the work of dentistry unless he had been qualified by the Board. Formerly any qualified dentist could set himself up as a "prosthodontist" and practise the speciality but now any dentist who wished to practise as a specialist must be qualified by the Board. A prosthodontist was not only a dentist but must have special qualifications and have taken post-graduate courses as well.

Dr. Terrell's evidence as to the full scope of the work of a prosthetist is in line with the authority of the text books which have already been quoted. The work, after preliminary examinations, extended from the taking of the impression and proceeded through the various steps of construction to completion. The dentist did all this work himself and he might delegate the purely mechanical part of it to technicians. The dental technicians' work was confined to laboratory work only under the instruction of a prosthetist. It was wrong, according to practice, in America to apply the word "prosthetist" to one who was only a technician.

No oral evidence was presented on behalf of the respondent Association, but Mr. Hogan of Counsel on its behalf tendered a number of publications. The first three exhibits were monthly parts of the Dental Magazine and Oral Topics—an English publication. The material relied upon in these journals was a number of advertisements from dental mechanics and dental laboratories containing statements such as "Good Prosthetic Work of Every Description," "Every Description of Prosthesis," "Specialists in all branches of Prosthesis," and one in which a laboratory described itself as "dental prosthetists to the profession." Dr. Arnott regarded the last description as quite incorrect, and the other advertisements as most misleading. He drew a distinction between "prosthetist service" and "prosthetic service." The former was a service rendered by a prosthetist. A mechanic could render a "prosthetic service" but not every branch of prosthetic service.

As to the advertisements which were shown him, he said that he would have no objections to laboratories holding out the services in the words used but would if it was an advertisement of an individual mechanic. It would be in order if the advertisement was read by a dentist looking for someone to do his mechanical work. Other advertisements put in evidence are contained in Exhibit 7 in the Dental Journal of Australia, Volume 18, Number 6.

In my view the advertisements clearly give no justification at all for the use of the word "prosthetist" by a dental mechanic and read as a whole and in their setting it is clear that the journals are no more than advertising the work of dental mechanics. Mere advertising puff can, of course, give no meaning to words that they otherwise do not possess.

Another journal tendered in evidence on behalf of the respondent Association was the Dental Laboratory Review, Volume 24, Number 9, an American Publication described as "A Monthly Journal for Operators of Dental Prosthetic Laboratories." Attention was drawn to several parts of sentences by markings

in an article headed "Collaboration Lacking in Italian Dental Groups" by Dr. Guzman Di Domenico, Rome, Italy. Particular attention was drawn to the use of the term "prosthetic" as applying to a denture but Dr. Terrell said, in his evidence, that he had never heard the term so applied in America. The following paragraphs (paragraphs 2 and 3) at page 19 in which the marked passages appear, might I think be set out in full. They are informative as illustrating in a publication from such a source the difference between the dentist's and the technician's work:—

> 2. Checking of a patient's mouth and teeth, in order to decide upon indication or counter-indication for the various types of dental prosthetics to be applied, as well as the preparation of the mouth, the taking of impressions, and the fixing of the prosthetic in the patient's mouth, are exclusively reserved to the province of the M.D.-dentist, or to the authorized dentist.
>
> 3. Dental technicians are authorized only to construct dental prosthetics on models from impressions furnished to them by an M.D.-dentist, or authorized dentist, together with the necessary instructions on how to proceed. It is prohibited to dental technicians to perform any operation, surgical or non-surgical, in a patient's mouth, even in the presence of an M.D.-dentist, or an authorized dentist.

The article was tendered also with respect to the passage underlined in the following quotation from page 22 of the article. I have included the whole of the setting in which the underlined passage appears, again as being informative. Dr. Domenico writes:

> "I have always taken special care that the dental technicians I have trained in my classes should not be taught the links that exist between the craft of dental technic and clinical preparation. Unfortunately, the textbooks available to the students of dental technic are a continuous invitation to practice in a forbidden branch. In fact, these books contain clinical notations and reference regarding work which should be done only by the M.D.-dentist. It would be advisable if in the future authors, who are experts in dental technic, would make a difference between textbooks for M.D.-dentists and books adapted to the education of a craftsman.
>
> "It is my opinion that until the limits regarding the collaboration of the dental technician and M.D.-dentist are clearly drawn, *you cannot speak either of a specialist in dental prosthetics or a specialist in dental technic.*
>
> For the time being, in Italy, an efficient dental technician, eager to become perfect in his craft, will encounter serious obstacles, until his natural leader, the M.D.-dentist, finds himself in a position to dominate in the clinical field."

Whatever may be the position in Italy, at least in this State there is no difficulty in determining between the specialist in prosthetic dentistry and the dental mechanic.

The other exhibits tendered by the respondent Association, I do not touch on. They carry the respondent's case no further.

The evidence for the applicant both oral and documentary is overwhelming in the weight of its authority that the claim of dental mechanics to be termed dental prosthetists has not a tittle of justification in law or fact, and so I hold.

Mr. Hogan submitted, however, that there was nothing intrinsically wrong in itself in the use of the term "prosthetist" in relation to dental mechanics. He contended that those with knowledge of the field in which they worked would not have the slightest doubt of what classes the respondent Asssociation consisted. The only evil would be that somebody might be misled and, in fact, Counsel submitted, there was no evidence that anybody had been misled. Some fear was expressed on behalf of the applicant Association that advantage might be taken of their description as prosthetists by dental mechanics to carry out

work which by law is the province of the registered dentist. There is no doubt that the use of the word by unqualified men would leave the way open to malpractices and public mischief and could cause untold harm to those properly entitled to call themselves prosthetists. I do not propose, however, to go into, and indeed I find it unnecessary to deal with, that part of the applicant's case.

As dental mechanics are not entitled to apply to themselves the description "dental prosthetists," it follows that the name of the respondent Association is not a correct one to describe the character of the Association.

"Under ordinary circumstances a Union of employees is free to adopt any name," said Beeby J., as he then was, in a judgment upon an appeal from a decision of the Federal Industrial Registrar granting the application of the Australian Federated Union of Locomotive Enginemen for the change of its name to the Australian Brotherhood of Locomotive Engineers (25 C.A.R. 126) "but", as his Honour proceeded to say, "when its registration is obtained by virtue of and for the purposes of the Commonwealth Arbitration Act the name chosen becomes a matter of public importance and in order to prevent confusion in the grouping of industries must be subject to supervision. In that case his Honour pointed out that in Australia the term "engineer" had been applied to either skilled mechanics engaged in the construction of machinery or to persons of professional or semi-professional status engaged in designing and supervising the construction of machinery, etc., while those who drove and attended engines after construction had always been classified as engine drivers or enginemen. His Honour in allowing the appeal came to the conclusion that the locomotive enginemen were not justified in adopting the same title for their occupation as skilled mechanics or professional men, and their registration under the title of locomotive engineers might be a source of confusion (See also O'Mara J. in 52 C.A.R. at page 30).

In the present case there was no appeal against the change of name and the reason for the delay in bringing the present matter under the notice of the Commission has been adequately explained. In this case, as in the one before Beeby J., it is apparent that there was no justification for employees in the trade or calling of dental mechanics adopting the title of dental prosthetists, which alone may belong properly to registered dentists.

There can, of course, be no objection to a Union taking as its name one which accurately describes the work or profession of its members. And in this connection not only is the name of the respondent Association important in the present case, but its Constitution Rule (2) also. That rule has already been quoted. According to it, the Association consists of dental prosthetists, not being persons registered as dentists under the Dentists Act; and dental apprentices. Leaving aside for the moment the matter of dental apprentices, it is clear from the language used, in the light of what the Commission has found to be the proper use of the word "prosthetist," that *prima facie* the persons entitled to become members of the respondent Association are not persons who carry out the laboratory processes only in the construction or manufacture of dentures or other prosthetic appliances, but persons skilled in the full range of dental prosthetics. The constitution rule does not in words purport to cover dental mechanics. As the rule excludes any prosthetists, if they are registered as

dentists under the Act, and, as registration is a condition precedent to entitle a person so qualified to carry out the practice of the profession in this State, it is difficult to say whether the constitution strictly covers anybody at all, even dental apprentices. For the evidence of Dr. Arnott is that, prior to the 1934 Act, dental apprentices were students registered as apprentices to dentists. They served a certain time with the dentists and they then could sit for examinations set by the Dental Board. The 1934 Act abolished that system.

For the purposes of the Industrial Arbitration Act, it is essential that the craft or calling of persons of which an industrial union is constituted should be correctly described and readily ascertainable. As an illustration of this need, in the commencement of proceedings for an award before a Committee, applications in the case of an industrial union are limited to those whose members are employees in the industry or calling for which the Committee has been established. If the terms in this case are strictly interpreted, an industrial union of dental prosthetists or dental apprentices could have no right to apply for an award to a Committee established for the industry or calling of dental mechanics.

No evidence was called by the respondent Association setting out the reasons which led it to change the form of its constitution and its name, and Mr. McKeon claimed that its actions were open to a charge of want of *bona fides* when consideration was given, amongst other things, to the presentation of its case before the Dental Mechanics (State) Conciliation Committee in proceedings last year for a new award. The proceedings before Mr. Commissioner Barker were placed before the Commission and Ex. B in the present matter was an Exhibit marked E tendered on behalf of the Association in those proceedings in the course of the evidence of Mr. J. P. Kennedy, who described himself as a dental prosthetist at the Dental Hospital, Sydney, and who stated that he learned his trade while he was in the Army. Mr. Kennedy in fact is a dental mechanic. Committee Exhibit E is as follows:—

> "Such an examination might well be termed a survey since the making of dentures is so largely an engineering problem, aside from the esthetics and art principles involved. The essential features to be noted form a striking parallel to those in surveying, viz.: the surface area, its boundaries, the nature of the surface, whether hard, soft, etc.; its topography, comprised in ridges, elevated points and depressions. Indeed the engineering point of view, under one name or another, and an analysis of the significance of these factors, are absolutely essential to the success of the dentures, whether retained by mechanical means or by so-called atmospheric pressure. This by no means implies neglect of the other elements concerned, such as the anatomy of the parts, their physiological function, and the pathological or other deviation of each from the normal. In other words, the prosthetist must be diagnostician, engineer, skilled technician and artist combined."

The passage is the second paragraph of Chapter 11 from American Textbook of Prosthetic Dentistry, by L. Pierce Anthony, D.D.S.

The claim as to wages before the Committee was left to the determination of Mr. Commissioner Barker, and in his written decision of 11th August, 1950, Exhibit E was set out in full. Immediately following the quotation Mr. Barker said:—

> "Except as to the two last sentences contained in the above extract, the parties were agreed that the work described would reasonably come within the scope of the duties of a dental mechanic."

Chapter 11 from which the extract was taken is headed "Mouth Examinations Preliminary to Denture Construction" and is by Edwin H. Mauk, D.D.S. I now quote the first paragraph of the article which immediately preceded the extract placed before the Committee:—

> "As the first step in the construction of artificial dentures, a careful examination of the mouth is required in order that the prosthetist may know the conditions to be encountered, favourable or otherwise, and estimate the success to be attained by taking advantage of the favourable conditions and modifying the unfavourable ones if possible. An examination is essential also for the formulation of an intelligent plan of procedure to determine the design of dentures, and as a basis for consultation with the patient as to the time and expense involved and the results to be expected."

The book was placed in evidence before me and Dr. Terrell said that it was a text book for students in dentistry and was also used by many practising dentists as a text book. Chapter 11 was entirely an article for the dentist to aid him in making an examination of the mouth prior to construction of dentures and was in no way given as a text to follow for the mechanical construction of dentures. A technician had never any opportunity to make mouth examinations preliminary to denture construction.

Anthony's full work was also received in evidence before the Committee. When the extract, Exhibit E, is read in its setting, it is incomprehensible how the parties before the Committee could have agreed that except as to the last two sentences of the exhibit the work described would reasonably come within the scope of the duties of a dental mechanic. One can only conjecture that the parties did not read the first paragraph in the article or, if they did read it, they did not understand it.

What weight was given to Exhibit E by Mr. Commissioner Barker, it is impossible to say. Properly understood, it should have been disregarded entirely as having no relevancy to the work of dental mechanics.

Mr. Kennedy in the course of whose evidence Exhibit E was tendered said that he was still doing studies and that one of the books he studied was this American Textbook. This is a matter which Dr. Di Domenico, in the journal placed in evidence by the respondent Association itself, touched upon in his article quoted earlier.

Mr. McKeon strongly criticised the action of the respondent Association in the use it made of Exhibit E before the Committee and submitted that it was used knowingly and wilfully and for no other reason than to persuade the Committee that a body of enlightened thought spoke so highly of the work of the persons whose wages the Committee was asked to fix. I think the tendering of the matter in Exhibit E as illustrating something of the work of dental mechanics was most reprehensible. It was calculated to mislead and apparently did mislead the parties at least.

In this matter, I find the respondent Association has no colour of right to describe itself as an Association of dental prosthetists, and that to be allowed to continue on the register of industrial unions with its present name and constitution would, to put it at its lowest, cause confusion. Other weightier reasons appear from what has already been said as to why the respondent Association ought not to be permitted to retain its present name and constitution.

A further reason appears in the evidence of Dr. Arnott, who said that a Post-Graduate Committee in Dental Science has been established with a view eventually to establishing a post-graduate school in the Faculty of Dentistry within the University of Sydney, at which graduates could qualify for diplomas in various branches of dental science, e.g., in prosthetic dentistry. A graduate so qualifying would necessarily be a dental prosthetist.

Under section 8(8) of the Industrial Arbitration Act the Commission may for any reasons which appear to it to be good cancel the registration of any industrial union. I am satisfied that the facts of this case fully justify the cancellation of the registration of the respondent Union as an industrial union and I according grant the application.

It was stated, however, by Mr. McKeon that the Association for whom he appeared did not wish that dental mechanics should be completely deprived of any right to registration and he suggested that if an order of cancellation was made it might be allowed to lie in the Registry for a reasonable period to enable the respondent Association to change its name and upon the Association changing its name to one which properly described its membership the order of cancellation might be revoked. It seems to me that the Commission might fairly act on the suggestion.

Dr. Arnott in his evidence stated that he could see no objection to dental mechanics taking the name of dental prosthetic technicians. The Associations of the callings in question in Victoria and Tasmania, are named Dental Technicians Associations as also they are in the United States and in England. In view of the misuse that the respondent Association has made in the past of the words "prosthetic" and "prosthetist" I do not favour the inclusion of the word "prosthetic" in its title. I am prepared to allow the present order of cancellation to lie in the office of the Registrar for one month, or such longer period as may be reasonably necessary, to enable the respondent Association to take the necessary steps to change its name to the Dental Technicians Association of New South Wales and to make appropriate amendments to its rules. Any such amendments should first be submitted to the Registrar and by him submitted to the Commission for approval.

The existing award was made by the Dental Mechanics (State) Committee on the application of the Dental Prosthetists Association of New South Wales and may be open to challenge, having regard to the proper meaning of the word "prosthetist," on the ground that the Committee was not competent to hear the claim of the Association. In any case, the award must be varied wherever it uses the word prosthetist. The Commission will, therefore, in due course move the Registrar to issue a summons calling upon the parties to the award to show cause why it should not be rescinded or varied in such manner as to the Commission may seem proper. Moreover, provided the respondent Association changes its name and its rules within the period stated, the Commission will, of its own motion, consider the alteration of the assignment of industries and callings to as well as the title of the Dental Mechanics (State) Committee, to bring the nomenclature into line with the new style of the Association.

The Commission makes an order for the return of the Exhibits to the respective parties upon the usual undertaking.

THE UNIVERSITY OF SYDNEY

It was gratifying to note that the State Government recently increased their subsidy to the University of Sydney to such a degree that the University became eligible for certain monetary benefits granted by the Federal Government. There can be no doubt in the minds of any members of the profession that money invested by the Government in this institution can only bring about good. Whether the amounts made available are adequate is not a point to be debated here.

These grants do not allow us to adopt a complacent attitude and permit the function and finances of the University to become a matter purely for the concern of public service officials.

The University of Sydney has now been serving this State for almost a hundred years. Over the past fifty years it has played a major part in preparing students for entrance into the profession of dentistry and since 1934 it has been entirely responsible for the training of future dentists within this State. Of recent years the control of post-graduate studies in dentistry has also been placed in its care, so that the future of the profession is undoubtedly linked with the future welfare of the University.

Some months ago an appeal was started for funds, in order that it might continue its good work. The response to this appeal has been remarkably disappointing.

The profession has been fortunate in that a particularly fine dental hospital has been in existence for many years, and is now being extended to assist in the teaching within the Faculty of Dentistry. Too often, however, is it believed that imposing structures are the answer to requests for greater facilities for teaching. Unless the University can supply sufficient funds to enable the Faculty to obtain and hold teachers of the highest standards, it will not be able to fulfil its duties to the profession adequately.

Assistance in supplying funds to the University is as much our responsibility as any other group or profession. It is to be hoped that all members will take the opportunity as soon as possible to make their donations to the University appeal.

News and Notes

INSTITUTE OF DENTAL SURGERY (UNIVERSITY OF LONDON)

A full-time course in Orthodontics will commence on 1st October, 1951. The duration of the course will be for six months or may be extended to one year if desired. The time-table has been arranged so that all lectures, both in Orthodontics and allied subjects such as Anatomy, Physiology, Speech Therapy, Genetics, Anthropology, etc., will take place in the first and second terms. Previous experience, while not essential, is desirable. The fee for the course is £50 for six months and £60 for one year. Application forms may be obtained from the Dean, Institute of Dental Surgery (University of London), Eastman Dental Hospital, Gray's Inn Road, London, W.C.1, England, and should be returned to him on or before 1st September, 1951.

HIS MAJESTY'S COLONIAL SERVICE — NIGERIA

Dental Officers, male or female, required. Appointment for permanent and pensionable employment will be on 3 years' probation in the scale £890-£1,600 per annum (including pensionable expatriation pay). Normal tour of service is 18 months. If preferred, employment may be on contract for 5 tours of 10 months each in the scale £1,030-£1,720 per annum with a gratuity on completion of contract earned at the rate of £100-£150 per annum. Temporary cost of living allowance is also payable. Private practice is permitted for the present. War service and experience will determine initial salary. Quarters are provided at low rental. Free passages for officers and wives. Income tax at low rates. Generous home leave. Candidates must possess a dental qualification registrable in the United Kingdom. Intending applicants should write to Professor Wadham, Liaison Officer for Colonial Service Appointments, Melbourne University.

DEPARTMENT OF HEALTH

Applications are invited for the position of Senior Dental Officer in the Northern Territory.

Salary: £1390-£1576 per annum. In addition, a District Allowance of £150 per annum is payable if married and £125 per annum if single. Subject to the provisions of the Income Tax Assessment Act a Zone Allowance Deduction of £120 per annum may be allowable.

Duties: Responsible to the Deputy Director of Health in the Northern Territory for the conduct of all dental activities in the Northern Territory, including aerial and mobile dental services and to act as consultant when necessary.

Qualifications: Applicants must be eligible for registration as a dentist in Australia and produce evidence of sound professional knowledge and wide administrative experience.

Applications stating age, experience, qualifications, marital status, war service and enclosing copies only of references, to be forwarded to the Director-General of Health, Canberra, A.C.T.

XIth INTERNATIONAL DENTAL CONGRESS

LONDON, JULY, 1952.

Membership forms for the XIth International Dental Congress are now available from all State Branches of the Australian Dental Association. Intending members should contact the Secretary of their own State Branch as soon as possible, to avoid disappointment.

THE AUSTRALIAN ORTHODONTIC ASSOCIATION

The Australian Orthodontic Association is holding its first conference in Melbourne on 3rd July, 1951.

Members of the Australian Dental Association desirous of attending are advised to make application to the Secretary of the Association, 5 Collins Street, Melbourne.

WESTERN SUBURBS DENTAL GROUP

The fourth Annual Ball of the Western Suburbs Dental Group will be held at the Petersham Town Hall on Tuesday, 12th June, 1951. Tickets are one guinea each and may be obtained from F. Dennett, 220 Liverpool Road, Ashfield, with whom reservations may also be made.

PRACTICE FOR SALE

Long-standing practice in Macquarie Street for sale. Apply in first instance to The Secretary, Australian Dental Association, New South Wales Branch, B.M.A. House, 135 Macquarie Street, Sydney.

FOR SALE

Vacant possession available of a dentist's former surgery and dwelling in an excellent position close to town. Suitable for one or more dentists (two surgeries). On main road at two tram-stops, close to railway station. Ring LA 1826.

X-ray tube for Ritter X-ray machine. Details can be obtained from the office of the Association.

Association Activities

AUSTRALIAN DENTAL ASSOCIATION
NEW SOUTH WALES BRANCH
EXECUTIVE MEETING

Extract from the Minutes of the Meeting of the Executive Committee held in the Council Room, B.M.A. House, 135-137 Macquarie Street, Sydney, on Monday, 9th April, 1951, at 7.30 p.m.

Present: Dr. E. R. Magnus, President, in the Chair; Dr. A. G. H. Lawes, Vice-President; Dr. F. E. Helmore, Vice-President; Mr. F. R. Reid, Honorary Treasurer; Dr. E. H. Bastian, Mr. H. M. Finnie, Mr. W. A. Grainger, Mr. R. Krauss, Mr. R. G. Leeder, Mr. R. Y. Norton, Mr. R. Tompson, Mr. R. W. Wilson, Mr. A. G. Hunter, Mr. E. J. Gee, Mr. J. G. Fletcher; Mr. M. J. Griffin, Blue Mountains Division; Mr. C. Reynolds, Far North Division; Mr. L. Cooper, Southern Tablelands Division; Dr. J. Oddy, South Coast Division; Dr. A. G. Rowell, Western Division.

Apologies: Mr. N. E. Edney, Mr. A. R. Wooller, Mr. S. H. Neal.

In attendance: Mr. E. F. Hewlett, Secretary.

Minutes: The Minutes of the Ordinary Meeting held on 12th March, 1951, were signed as a correct record.

Business Arising from the Minutes:

Dental Prosthetist matters: The President referred to the Judgment by Mr. Justice Webb, copies of which have been circulated to members of the Executive. He stated that the Judgment would be of great value to this Association.

It was resolved that letters of appreciation be sent to Professor Arnott, Dr. Graham, Mr. Croker and Dr. Terrell, enclosing a copy of the Judgment and thanking them for the time they had given to the case.

Forms of Membership: The President stated that the Honorary Officers had considered the matter of the revision of forms of membership, as referred to it by the Executive Committee, and had resolved that the Committee dealing with the change of Articles give consideration to the matter of forms of membership as indicated by the Executive.

Projector: The Secretary reported that he had obtained a quote for a suitable projector and it was resolved that the projector be purchased.

Business of the Meeting:

Shortage of X-Ray films: The President stated that a letter had been written to the Federal body concerning the shortage of x-ray films and asking for their attention to this matter.

It was resolved that the action taken be endorsed.

Reports from Committees:

Honorary Officers—Dental Board elections: The President stated that consideration of persons for the Association's endorsement as candidates for election to the Dental Board of New South Wales in June of this year was necessary. It was indicated that this matter should be considered at the next general meeting of the Association, when members would have the opportunity to select, if necessary by ballot, those members whom the meeting considered should have the support of the Association in the above election.

Following discussion it was resolved that the Executive recommends to the general meeting, to be held on 24th April, 1951, that six members shall carry the endorsement of the Australian Dental Association, New South Wales Branch, in the forthcoming election of four dentists to the Dental Board of New South Wales.

The President reported that the Secretary had written to the four present members of the Dental Board asking that they indicate their willingness or otherwise to stand for re-election at the next Dental Board election, and that two members had indicated that they were willing to stand for election and that the other two had indicated that they did not wish to resubmit their names.

The President then called for nominations of persons to be recommended by the Executive to the general meeting for their consideration in the matter and eight persons were nominated.

It was resolved that these eight names be submitted to the next general meeting of the Association by this Executive for their consideration in the ballot for the endorsed candidates for election to the Dental Board of New South Wales.

Dental Health Committee: The Chairman of the Dental Health Committee reported that the Committee had met and carefully considered the financial position of the Dental Health Education Department and its projects for 1951, which included the publication of 40,000 copies of "Healthy Mouths", the School Essay Competition, lectures to various bodies, the showing of the Dental Health Exhibit and the possible printing of diet sheets and reprinting of Dental Health Education material.

Syllabus Committee: The Chairman reported that the Syllabus Committee had met and discussed the lectures to Fourth Year students in 1951 and the programme for general meetings for the latter part of this year.

Library Committee: The Chairman of the Library Committee reported that the Library Committee had reviewed the damage recently done to the Library by accidental flooding and that the matter was being attended to satisfactorily. He stated that the Library Committee recommended the purchase of the following books:

Tomes' Dental Anatomy, ed. Tims & Henry,
Cipes, Prescription Writing and Materia Medica for Dentists, ed. 3,
Black, Operative Dentistry, 1948 (4 vols.),

and that the Association subscribe to the *Journal of Prosthetic Dentistry*.

It was resolved that the recommendations of the Library Committee be adopted.

Post-Graduate Committee: The Chairman, Mr. Grainger, reported that the Post-Graduate Committee had met, and outlined a scheme under consideration for the provision of post-graduate courses by the Association.

Membership:

New Members: The following dental practitioners were admitted as new members of this State Branch as from 9th April, 1951:

Bennett, Stanley Middleby, B.D.S.; Bice, John Allan, B.D.S.; Chandler, Christopher Roy, B.D.S.; Clark, John Peter, B.D.S; Gain, John Lindsay, B.D.S.; McCrossin, Robert Hugh, B.D.S.; Manzie, Andrew Winwood, B.D.S.; McNaughton, Ian Arthur, B.D.S.; McTaggart, James Benedict, B.D.S.; Niccol, Thomas Gregory, B.D.S.; Reiser, Wolfgang Emil, B.D.S.; Wooller, Alfred John C., B.D.S.; Riddel, Roy Gordon, B.D.S.; Robinson, Patricia May, B.D.S.

Student Associates: The following Fourth Year Students in the Faculty of Dentistry, University of Sydney, were accepted as Student Associates of this State Branch as from 9th April, 1951:

Trinder, Henry Stephen; Bell, John Edgar; Price, Russell Charles; Coxon, Alfred Peter; Hudson, R. W. (Jnr.); McGregor, Allister Gordon; Bartlett, John Christopher; Buchman, Mieczyslaw; Ruprecht, Donald Milne; Murphy, Arthur Lloyd; Eliott, Gilbert R. R.; Groves, Neville Leslie; Garrick, Desmond Noel; Taylor, Bruce Walton; O'Neill, Patrick Joseph.

Correspondence:

A letter from the Secretary of the Dental Assistants' Association was read requesting lectures to the Dental Assistants' Association. It was resolved that the Secretary contact Miss Endicott and arrange place and time for the lectures and report to the Executive.

A letter from the Secretary of the Far North Division was read requesting that the Education Department be approached concerning the marking of children absent when they are keeping dental appointments. It was resolved that the Education Department be approached in this matter.

Financial Statement:

The Honorary Treasurer, Mr. F. R. Reid, tabled the Financial Statement for the month of March, 1951, which had been circulated to members of the Committee.

It was resolved that the Financial Statement for the month of March, 1951, be received.

General Business:

Electricity zoning: The President reported that a statement on electricity zoning, as it affects members, would be made as soon as more information as to the regulations and their application was available.

Closure of meeting: The meeting terminated at 11 p.m.

GENERAL MEETING

Extract from the Minutes of the General Meeting held in the Lecture Hall, B.M.A. House, 135-137 Macquarie Street, Sydney, on Tuesday, 24th April, 1951, at 8 p.m.

Present: Dr. E. R. Magnus, President, in the Chair, and an audience of 160 members and visitors.

In opening the proceedings, the President welcomed Mr. C. Horne of New Zealand, who presented greetings from the Auckland Branch of the New Zealand Dental Association.

Minutes: The Minutes of the General Meeting held on 20th March, 1951, were read and signed as a correct record.

Reports by Chairman:

Anzac Day March: The Chairman reported that in the Anzac Day march on the following day the Army Dental Corps were marching as a unit for the first time, and indicated the time and place of assembly.

Dental Prosthetists' Association matters: The Chairman reported the success of the action recently taken before the Industrial Commission of New South Wales concerning the Dental Prosthetists' Association, outlining the history of the case and indicating that the Judgment concerning same would be published in full in the Journal.

Dental Board Elections:

The President indicated that the Dental Board elections were to be held in June, 1951. He stated that the Executive recommended to this General Meeting that six members carry the endorsement of the Australian Dental Association, New South Wales Branch, in the forthcoming election of four dentists to the Dental Board of New South Wales.

It was resolved that this recommendation be adopted.

The names of eight persons prepared by the Executive were read to the Meeting and these eight persons, together with two further persons, were duly nominated. A ballot took place which resulted in the following six persons becoming those to receive the Association's endorsement in the forthcoming Dental Board election to be held in June, 1951 (in alphabetical order):

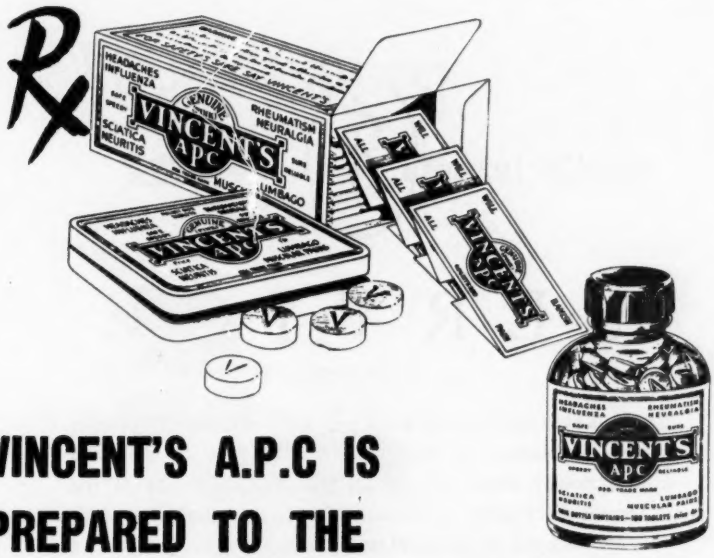
Dr. J. S. Baird, Mr. N. E. Edney, Mr. R. Hawthorne, Dr. A. G. H Lawes, Dr. E. R. Magnus, Mr. J. W. Skinner.

Lecture:

The Chairman introduced Professor W. J. Tuckfield, who presented an interesting lecture entitled "The Problem of the Mandibular Denture".

Following the lecture some discussion took place, and a vote of thanks to Professor Tuckfield was moved by Dr. E. Deck and carried by acclamation.

The meeting terminated at 10 p.m.



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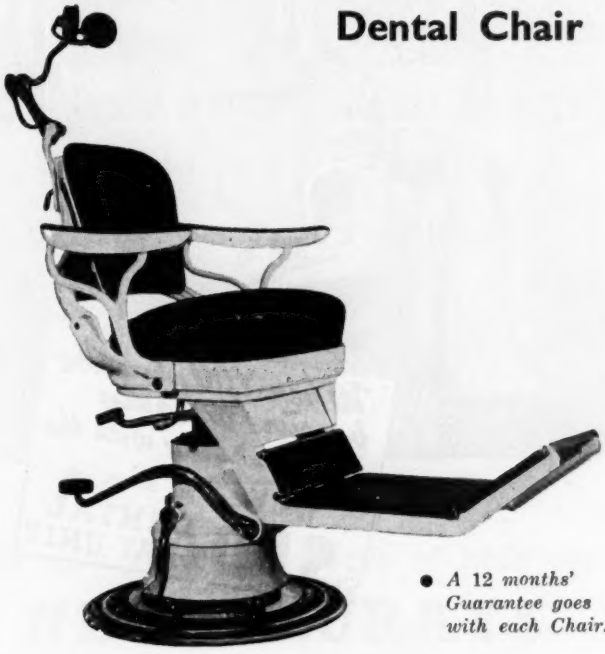

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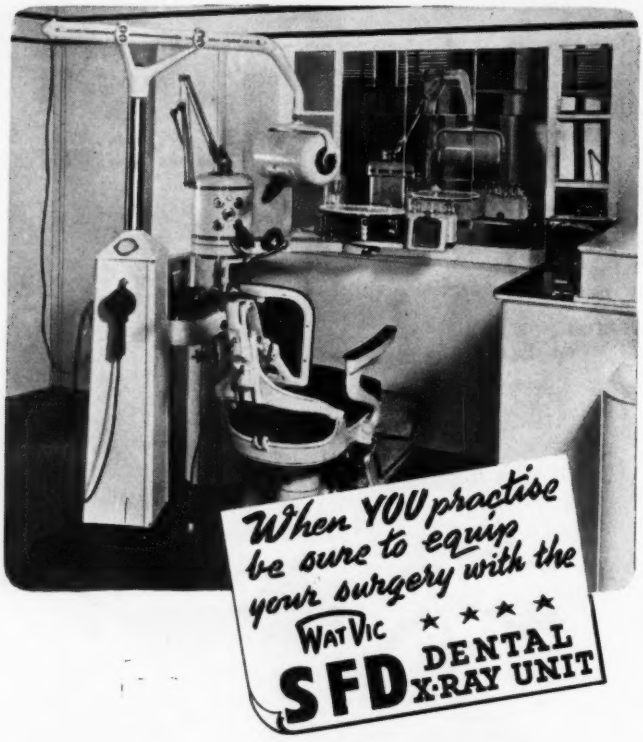

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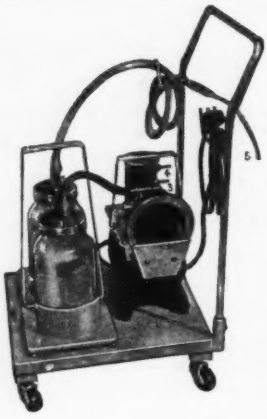

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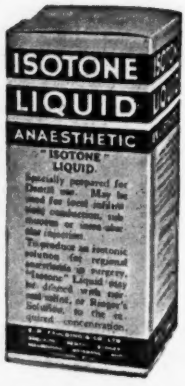

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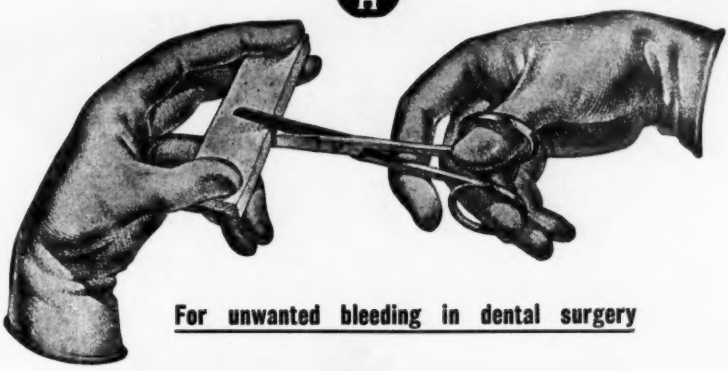

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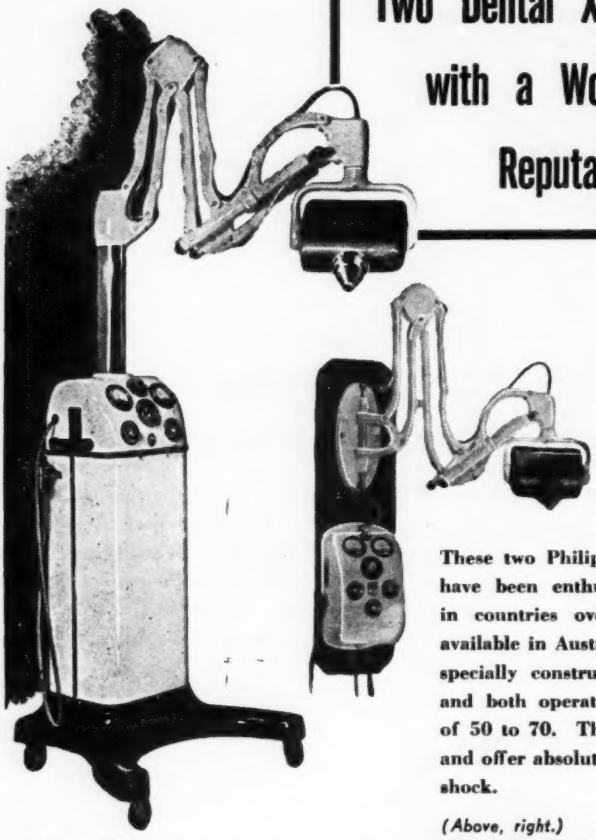

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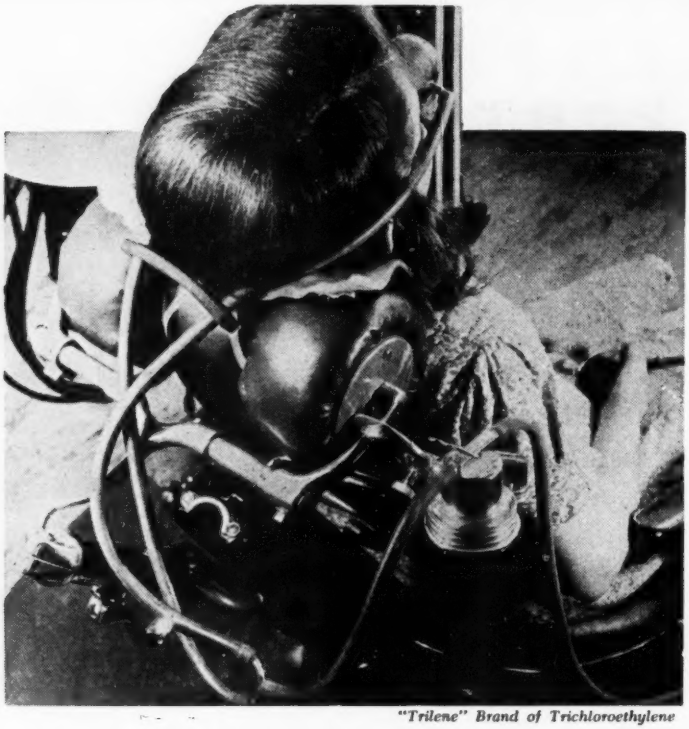

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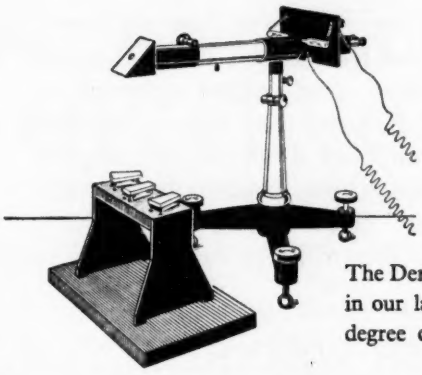

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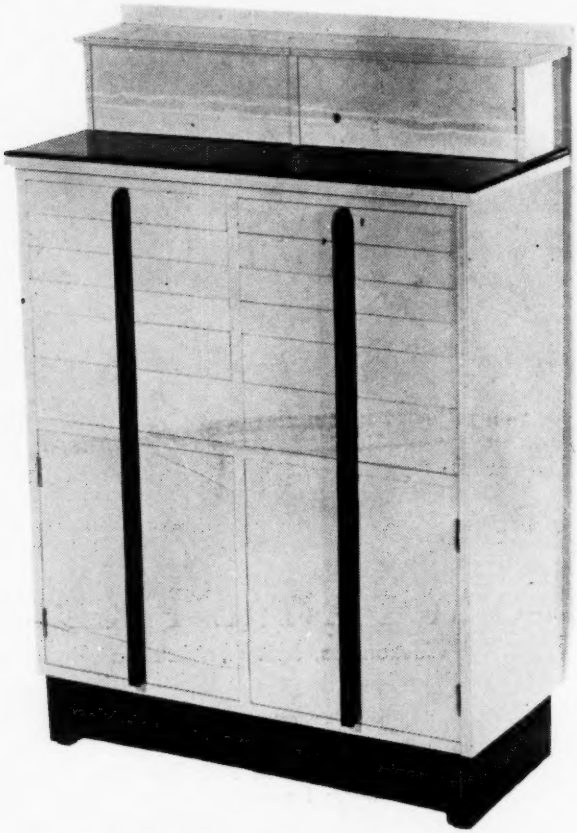

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